Introduction to Computers

A computer is a man made electronic machine which stores, reads and processes data to produce meaningful information as output. It works very fast and does not make mistakes but its capacity is limited. It is made of English word 'to compute'. It operates under the control of a set of instructions that is stored in its memory unit.

A computer accepts data from an input device and processes it into useful information which it displays on its output device.

Actually, a computer is a collection of hardware and software components that helps us to accomplish many different tasks. Hardware consists of the computer itself and includes a CPU, a monitor, a keyboard, a mouse and any equipment connected to it. Software is the set of instructions that the computer follows in performing a task.

Computers and Calculators

A calculator is a small electronic device used for doing mathematical calculations. A calculator cannot be used for writing letters or drawing images, while a computer can be used to calculate, draw images, write letters, and do many other things as well.

Human Being and Computers

Computers cannot work on their own. They do what we want them to do, only we give them the right command. Its memory is better than human memory. It can't forget anything it has saved, so it is also called an artificial intelligence.

Comparison between Human beings and Computers

Human being	Computer
Human beings are slow in doing calculations.	Computers can do complex calculations in seconds.
Human beings cannot remember lots of things at one	Computers can store and remember a large

time.	amount of information at one time.
Human beings can make mistakes.	Computers do not make mistakes.
Human beings have feelings.	Computers do not have feelings.
Human beings can think.	Computers cannot think.
Human beings get tired if they work for long hours.	Computers never get tired.

Elementary words related to computer

➢ **Data:** Data is information required by the computer to be able to operate or to put it the other way information we put into the computer is called data. It is gathered from any source but cannot be organized. It cannot be used for decision making. It is a collection of unprocessed items and combination of characters, numbers and symbols collected for a specific purpose. Generally it is divided into three types: numeric data, alphabetic data and alphanumeric data.

1. **Numeric Data:** Numeric data consists of ten digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. There are different types of number system that are used to represent numeric data. These number systems are decimal number system, binary number system, octal number system and hexadecimal number, system. Examples are examination score, bank balance and pin-code etc.

2. **Alphabetic Data:** Alphabetic data is used to represent 26 alphabetic. It consist of capital letters from A to Z, small letters from a to z and blank space. Alphabetic data is also called non-numeric data. An example is the address of an employee.

3. **Alphanumeric Data**: Alphanumeric data is used to represent alphabetic data, numeric data, special characters and symbols. An example is any password.

➢ **Information:** Information is well organized data which we get after processing of data and it helps in decision making. It is processed data that is organized, meaningful, and useful.

Characteristics of a computer

Computers are the foundation of business, travel, and leisure of life today. The common characteristics that make computers of all sizes such a powerful machine are speed, accuracy and reliability, storage capacity, ability to operate automatically, diligence, scientific approach and versatility.

1. **Speed:** 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. The speed of a computer is measured in the following time units for the access time or instructions per second.

Millisecond [1ms]   A thousandth of a second or 10^{-3}

Micro second [1ms]   A millionth of a second or 10^{-6}

Nano second [1ns]   A thousand millionth of a second or 10^{-9}

Pico second [1ps]   A million millionth of a second or 10^{-12}

KIPS   Kilo Instructions Per Second.

MIPS   Million Instructions Per Second.

1. **Accuracy and Reliability:** Computers are quite accurate and extremely reliable as well. They are only a machine and do not make errors on their own. Errors are caused by humans, not by computers.
2. **High Storage Capacity:** Computers are capable of storing enormous amounts of data that must be located and retrieved very quickly. The capability to store and retrieve volumes of data is the core of the Information Age.
3. **Automation:** Once a process has been initiated, it is capable of functioning automatically. It does not require an operator at each stage of the process.
4. **Diligence:** It is capable of operating at exactly the same level of speed and accuracy even if it has to carry out the most voluminous and complex operations for a long period of time. It does not suffer from physical and mental fatigue, lack of concentration and laziness.
5. **Versatility:** The wide use of computers in so many areas such as commerce, scientific applications, education in day to day life is ample evidence of its versatility.

Basic applications/uses of a computer

1. **Entertainment or Recreation:** Computer is used for playing games, listening to music and watching movies. It is also used for making cartoon movies, animation films and drawing pictures etc.

2. **Education:** Computer is used in schools for teaching, doing mathematical calculations and completing homework.

3. **Banks:** Computer is used in banks for storing information about different account holders, keeping a record of cash and providing all kinds of information regarding any account in the bank. It is also used by ATM (Automatic Teller Machine) of a bank which provides cash without any bank staff.

4. **Railway stations and Airports:** Computer helps in providing information about seat availability, booking tickets and keeping records of all passengers. It helps in providing information about the arrival and departure as well as timing of trains and aeroplanes.

5. **Medical Science:** Computer helps in keeping records of all the patients in a hospital and doing a number of medical tests. It helps doctors in controlling machines in an operation theatre.

6. **Business:** Computers are used to type and print documents, letters etc. They help in keeping records of employees and sending e-mails etc.

7. **Defence:** In defence computer is used to help in building weapons, controlling their functions, launching missiles and keeping record of criminals. It helps in establishing communication links between the soldiers and their commanders through satellites.

8. **Designing:** Computer helps in designing magazines, newspapers, books and advertisements etc. It also helps in designing buildings, houses etc.

9. **Scientific research:** Computer is used in scientific research and is handy for all kinds of scientific research.

10. **Administration:** Computer is used to improve administrative services and their efficiency.

11. **Publication:** Computer is used in desk-top publication.

12. **Communication:** Computers are used in communication such as e-mail, chatting etc.

Limitations of a computer

1. **Lack of intelligence (Programmed by human/Can't think):** Though computer is programmed to work efficiently, fast and accurately, but it is programmed by human beings to do so. Without a program, computer is nothing. A program is a set of instructions. Computer only follows these instructions. If the instructions are not accurate the working of computer will not be accurate.

2. **Prone to virus:** The computer sometimes malfunctions and results in loss of data if some virus attacks.

3. **Depends on electricity:** One of the limitations also includes machine failure in case of some hardware or software problem. The computer sometimes results in loss of data if power fails.

Functions of a computer

1. **Data collection:** Data collection is a process of preparing and collecting data to obtain information to keep on record, make decisions and pass information on to others. Computers collect or gather data, which means that they allow users to input data.

2. **Data storage:** Data storage means that it retains digital data used for computing at some interval of time.

3. **Data processing:** Data processing is a process to convert data into information.

4. **Data output:** It is a processed data which we get as an output.

Impact of computerization

(i) Time saving   (ii) Errorless work

(iii) Saving of paper   (iv) Unemployment

Computer System

A group of equipments put together to process a data is called a computer system. A computer system consists of several components to achieve electronic data processing.

1. **Input Units:** They are devices which accept data from user and transmit it to the central processing unit as electronic pulses. For example, the ATM (Automatic teller Machine) system, when we want to withdraw, we are required to enter our Personal identification number (PIN). When we enter our PIN, we are using-an input device, the keypad.

2. **CPU (Central Processing Unit):** It is an abbreviation for central processing unit, and is pronounced as separate letters. The Central Processing Unit is the brain of the computer sometimes referred to simply as the central processor, but commonly called a processor. The Central Processing Unit is the unit where most calculations take place. It is linked with the input units and output units to form the computer system. In terms of computing power, the CPU is the

most important component of a computer system. On personal computer (PC) and small workstations, the CPU is housed in a single chip called a microprocessor or microchip.

The fundamental sequence of steps that a CPU performs is also known as the fetch-execute cycle or instruction cycle.

Functions of control unit

1. **Control flow of data**
 ➢ From input devices to memory
 ➢ From memory to output devices or secondary storage
 ➢ From secondary storage to memory
 ➢ From ALU to memory
 ➢ From memory to ALU
2. **Co-ordinates instructions execution**
 ➢ Fetch the instruction
 ➢ Decode the instruction
 ➢ Execute the instruction

More components of a CPU, that are vital to its operation, are the registers which are very small memory locations that are responsible for holding the data that is to be processed.

3. **Output Units:** Devices which accept information from CPU and convert it to human readable form. For example, when we pay the cashier in the supermarket, he will give a receipt. This receipt is a form of output from

 the output device known as printer.
 ➢ **GIGO (Garbage in Garbage Out):** It is a concept of computer science that the quality of output is determined by quality of input, means wrong input will result in wrong output. It is related to accuracy of input and output.