UNIT–I BASIC OF INFORMATION TECHNOLOGY

Familiarity with the Basics of Computers

INTRODUCTION

The word computer is made out of English word 'to compute', which means to calculate. A computer is a man made electronic machine which reads, processes and stores data to produce meaningful information as output. It works quickly and does not make mistakes, but its capacity is limited. It operates under the control of a set of instructions that are stored in its memory unit. A computer accepts data from an input device and processes it into useful information which is displayed on its output device. Actually, a computer is used for accomplishment of many different tasks. Hardware consists of the computer itself and includes a CPU, a monitor, a keyboard, a mouse, and many equipments connected to it. Software is the set of instruction that the computer follows to performing a task. It is versatile and can handle multiple tasks like accounting, entertaining, designing, documentation, importing, airlines, education, railways and other bookings, weather forecasting and many more. The acronym for COMPUTER is Common Oriented Machine Particular Education Research and Trading.

BASIC OF COMPUTER

Some decades ago, computers were known to a common man as simply as fast calculating device. But now with Information Technology (IT) revolution, computers have entered into each and every field of life. People in every walk of life now understand that the knowledge of computers is very essential if they need to keep pace with the information and technology in society. Computers have relieved us from the boring and tiring tasks like copying, comparing, choosing, checking etc., and now human time and labour can be used much more effectively. Let us quickly revise the definition of a computer.

Computer is fast electronic device which can very accurately process data given to it store data and produce desired output according to a given set of instructions.

FUNCTION OF COMPUTER

1. **Data Collection :** Data collection is a process of preparing and collecting data to obtain information and keep it on record, make decisions and pass information 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

EXAMPLES

Let us understand the way of function.

1. You want to speak to one of your friends. His Mobile Number is 9910134266. So you dial up the number and speak to your friend.
2. Your sister has to make tea. So she takes certain things (*ingredients*) *i.e.,* 3/4 cup of water, 1/2 teaspoon tea leaves, 1/2 teaspoon sugar and ½ cup milk. She makes the tea by following certain steps like boiling water, adding tea leaves, sugar and milk. Finally, the tea is prepared.
3. Consider a case when your sister asks you to baring cookies, biscuits and cold drinks from the market. You go to the market, purchase all of the things and give them to your sister.

PROCESSING CYCLE OF COMPUTER SYSTEM

A computer is also a system because it is a group of integrated parts, which are used to solve any problem by executing a suitable program.

A computer system comprises of three important parts- Input Unit, CPU and an Output Unit to perform each of the above functions.

Input Unit : Input unit is formed by attaching one or more input devices to a computer. The user enters data and instructions through input devices like keyboard, mouse etc. The input unit is used to provide data to the processor for further processing.

Keyboard

Mouse

Central Processing Unit (CPU) : CPU is the main unit of a computer. It controls all 1internal and external devices of a computer and performs arithmetic and logical operations. CPU is very small and is referred as microprocessor. A microprocessor is a type of integrated circuit built on a tiny piece of silicon. A microprocessor chip contains millions of transistors. The transistors work together to store and manipulate data so that the microprocessor can perform a wide variety of functions. The speed of a CPU is determined by the number of instructions it executes per second which is measured in Megahertz (MHZ).

CPU

Output Unit : The Output unit is formed by attaching the output devices to a computer. The output unit of a computer accepts the information from the CPU and displays the output in user readable form. The commonly used output devices are Visual Display Unit(VDU), Liquid Crystal Display (LCD), Printer, Speakers etc.

Colour Printer

INSTRUCTION CYCLE

Each computer's CPU can have different cycles based on different instruction sets, but will be similar to the following cycle—

1. **Fetch the instruction :** The CPU fetches the instruction from main memory via the data bus, and it is then placed into the CIR. The Program Counter is instructed to contain the address of the next instruction.

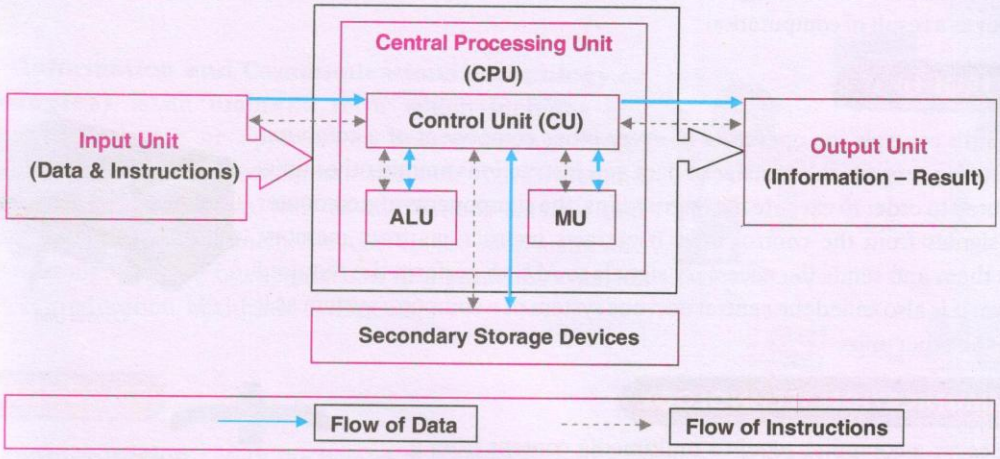


Figure Block diagram of a Computer System

2. **Decode the instruction :** The instruction decoder interprets instructions. If an instruction has an indirect address, the effective address is read from main memory, and any required data is fetched from main memory to be processed and then placed into data registers.
3. **Execute the instruction :** The CPU passes the decoded information as a sequence of control signals to the relevant function units of the CPU to perform the actions required by the instruction, such as reading values from registers, passing them to the ALU to perform mathematical or logical functions on them, and writing the result back into a register. If the ALU is involved, it sends a condition signal back to the CU.
4. **Store results :** The result generated by the operation is stored in the main memory, or sent to an output device. Based on the condition of any feedback from the ALU, Program Counter may be updated to a different address from which the next instruction will be fetched. The cycle is then repeated.

UNITS OF MEMORY

A computer stores and processes data or information in the form of binary numbers. The smallest unit of memory is Bit (Binary digit) that can hold a single state - either 0 or 1.

Other units of memory are:

Nibble	Group of 4 bits.
Byte	Group of 8 bits.
Kilo Byte	1KB=1024Bytes
Mega Byte	1MB=1024KB

Giga Byte	1GB=1024MB
Tera Byte	1TB=1024GB
Peta byte	1PB=1024TB
NOTE : $1024=2^{10}$	

ALU

ALU (Arithmetic logic unit) is the component of CPU which carries out the arithmetic and logical operations (*i.e.*, calculations). The arithmetic operations are addition, subtraction, multiplication and division. The logical operations are comparison operations like greater than (>), less than(<), greater than equal to (>=), less than equal to (<=), not equal to (<>) etc. Logic operations test various conditions encountered during processing and allow for different actions to be taken based on results. The data acts as the input for ALU and it generates the output as a result of computation.

CONTROL UNIT

This unit controls the operation of every other component of a computer system. It also controls the transfer of data and instructions among other units of computer. In order to execute the instructions, the components of a computer receive signals from the control unit. It extracts instructions from memory, decodes them and sends the necessary signals to ALU to perform the required operation. It is also called the central nervous system of a computer system as it manages all other units.

Control Unit

COMMUNICATION TECHNOLOGY

Whenever a computer requires multimedia content from a remote computer or a server, this information has to travel through computer networks using some communication technology. If the size of information is large, it must be compressed to reduce communication delay.

Mobile communication and Internet based communication technologies are the most common technologies used for the task.

Since, digital information can be broken up, coded and decoded easily; Internet is the most effective medium to send digital data across the globe.

Communication Technology

IMPACT OF IT

Information Technology acts as a medium to store, manipulate, distribute or create information. We can say that we live in an era where Information Technology has every section of the society and is heading towards the progress of mankind. Consequently, the question arises that does IT have only positive effects on our society? The answer is 'no'. Just like any other invention/technology, IT is also, a double edged sword. Internet users take

information from the sources available on the internet and present it as their own. This is the most common misuse of information.

Computer users must abide by the certain codes of conduct which are collectively known as "Computer Ethics". Computer Ethics are certain conventions which convey to the IT users to be responsible and selfless, in order to utilize the tools of IT, for the welfare of the society. The IT users should be well aware about the various ill effects of technology like malware, spam, cyber crime and piracy.

I.C.T

ICT (Information and Communications Technology or Technologies) is an umbrella term which includes any communication device or application, encompassing: radio, television, cellular phones, computer network, hardware and software, satellite systems, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, healthcare or libraries.

BENEFITS OF ICT

(i) **Communication :** With the help of ICT, communication become comparatively cheaper, faster and more efficient. Earlier, only large computers contained communication capabilities. Today, even the smallest of computers and devices have the capability to communicate with each other.

Today, the majority of computers are capable (through either a phone line or a cable connection) of exchanging information over the Internet. Your friend sends a message from his or her computer to the computer of a neighbour or a friend on the other phase of the planet. Students might use computers to communicate with their classmates about homework assignments, group projects, or other school-related activities. They may also use them to submit homework assignments and presentations to their teachers. In your everyday life, you use various communication technologies to generate information; for example voice mail, e-mail, telephony, groupware and social networking.

(ii) **COST EFFECTIVENESS :** ICT has helped to computerize the business process, thus, streamlining businesses to make them extremely cost effective, money making machines.

(iii) **BRIDGING THE CULTURAL GAP :** ICT has helped to bridge the cultural gap by helping people from different cultures to communicate with one another, and allow the free-flowing exchange of views and ideas, thus, increasing awareness and reducing prejudice.

BUSINESS

Today, almost every company has its own website to promote its services, which has proved to be beneficial. These organizations use internet to provide complex financial databases. Meetings can be scheduled and conducted through the video conferencing facility. It shows that most of the companies depend upon the internet and promote this business online and access international markets.

E-shopping has become one of the most substantial industries in the world. We can now purchase goods such as books, clothes, gift items, electronic gadgets from the various online shopping portals around the world.

- Use of ICT tools such as email, mobile phones, fax, online transaction etc. In business, it has provided finer correspondence between the customer and the seller.
- With the help of ICT tools, a customer can pay electronically using debit and credit cards, vouchers, paypal etc.
- Updating stocks and maintaining sales database has become quite trouble free to handle.

MANUFACTURING

Globalization has resulted in the major alterations of designing and manufacturing industries. Advancement in ICT has enhanced the quality of design and manufacturing and has enabled the designers and manufacturers to meet the demand of the consumers. It has made manufacturing innovative, efficient, user friendly and cost effective. ICT has revolutionized this sector. It is quite evident through the designs/models of buildings, automobiles, offices etc.

Complex designs and models can be easily with the efficient use of ICT. The major role of ICT in design and manufacturing are:

- It helps to manufacture products with designed of a *high degree of precision and accuracy.*
- It produces the products in vast quantity.
- It reduces labour cost.
- Organizes flexible and rapid workflow.
- Significantly minimizes the wastage of raw materials.
- Designs and information, related to them, can be sent around the planet.
- In manufacturing industries, robots are used to perform hazardous jobs such as working under excessive heat conditions, radioactive materials etc..

Healthcare : The information and communication technology(ICT) revolution has had dramatic impact up on the practices within the pharmaceutical industry and on the delivery of health services. There is an enormous range of opportunities with significant cost reductions, service enhancements and behavioral change.

ICT Benefit to the Patient : A complete medical history of the patients. Can be updated online and can be accessed from any where in the world because of ICT Patients are freed from keeping prescriptions for hospitals for further treatment. Online Medical advices would be arranged for the patients, so that they need not travel to the long distant spots.

ICT benefit to the doctors : To improve the efficiency and effectiveness of antiquoted healthcare system. Doctors would be able to access complete patient records, though they did not create them. Computerized system for writing prescriptions. Overall, the use of ICT in health care has shown clear benefits.

Governance : ICT also affects the governments by improving responsiveness, increasing efficiency and enhancing governance practices. Governments can encourage the diffusion of ICT through their supply of on-line services and their own use of updated technologies. The internet grants the government, an opportunity to offer public services and to provide information and policies more efficiently. More public services could be delivered through electronic media, such as the internet. Processing documents, such as licenses, or collecting taxes electronically are examples of such possibilities.

EDUCATION

Information and communication technologies (ICT) which include radios and televisions, as well as modern digital technologies such as computers and the internet—have been tagted as potentially powerful enabling tools for educational change and reforms. When used appropriately, different ICTs are said to support the expand access to education, strengthen the relevance of education to the increasingly digital workplace and raise educational quality among others, by teaching and learning into an engaging, active process connected to the real life. For developing countries, ICTs have the potential to increase the access to and improving the relevance and quality of education. ICT provides wider opportunities to scattered and rural populations, groups which are traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities and the elderly, as well as all of the others who, due to the reasons of cost or time constraints are unable to enroll on campus.

The main advantages of ICT over education are:

- Individuals can be educated any time and anywhere.
- Can access to remote learning resources. With internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at anytime of the day and by an unlimited number of people.
- Images or pictures can easily be used in teaching and improving the retentive memory of students.
- Teachers can easily explain complex instructions and ensure students comprehension.

DIGITAL CONVERGENCE AND MANY OTHER VARIOUS FIELDS

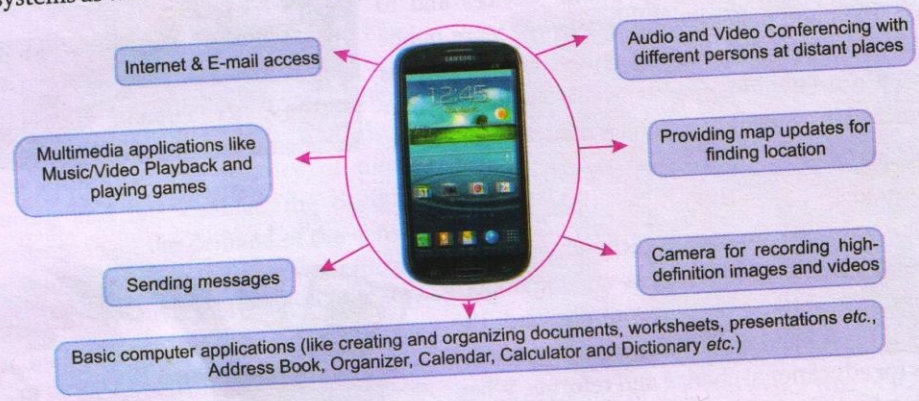
Let's take a peek at how a computer works. In a computer, each of these items is simply a collection of 1s and 0s. Almost everything like text, sound, speech, film, graphics, animation, music can be digital. Whatever gets digital, can be presented on a computer and transmitted over a network.

Innovations in the late 20th century have led to the merging of many new technologies, viz, Computer Technology, Content Technology and Communication Technology (*popular referred to as 3Cs of Technology*) into one product or service. The process by which all these separate media become digital is known as digital convergence.

Technological convergence also leads to devices which are designed specifically to replace a number of different devices. Cell phones, for example, have gone through a drastic shift. Beginning as simple voice communication devices they now offer multi-functions including features of personal music players, digital cameras, and text messenger systems as well.

Let's Know More

Skype is an application that allows users to make voice and video calls. These calls are free within the Skype network but the traditional calls to both landline and mobile phones are to be pre-paid.



Points to Remember

- ICT or computers play an essential role in how individuals work, live and learn.
- Organisations of all sizes, even the smallest schools and businesses, rely on computers to help them operat more efficiently and effectively.
- With the help of ICT, communication has also become cheaper, quicker, and more efficient.