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## **1.0 Learning Objectives :**

In this unit, we will discuss about the basics of computer system.

**After working through this unit, you should be able to :**

- History of computers
- Today's computer, Data and Information.
- Generation of Computers.
- Types of computers and software's.

## **1.1 Introduction :**

The term Computer is derived from the term compute. Compute means doing calculation. Originally, the computer is developed to perform faster calculations like Additions, Subtractions, Multiplications, Divisions and so on. But today we can carry out lot of activities like preparing letter or resume, making presentations, watching movies, listening music, doing chat with our friend who is miles away, sending mails and lot more. In this chapter we will try to focus on the entire process of how the computer system is build and enhanced to fulfil the requirements of 21st Century.

## **1.2 Evolution of Computer Technology :**

The origin of computer technology took place in 19th century. People in those days desired to have a machine that would perform mathematical calculations. ABACUS is considered as the first computer in the world. It was used to perform simple measurements and calculations.

In later period, the scientist named as Pascal developed a machine that could perform mathematical calculations. This machine had number of gears. The movement of gear mechanism used to perform some calculations. He named machine as PASCALINE.

However, the concept of a modern computer was put forward by the scientist and mathematician named Charles Babbage. He first wrote how to use logic and loops in a process execution. Based on the concept of logic and loops, Babbage developed two models for performing computations – Analytical Engine and Difference engine. In those days, electronics was not developed. Therefore, these models proposed by Babbage were having existence only on paper.

However, the ideas given by Babbage were implemented after invention of electronics.

George Boolean developed famous Boolean algebra based on binary numbers. De Morgan put forward theorems on logic gates. These theorems are known as De Morgan 's Theorems.

**Lady Ada is the first computer programmer.**

The real applications of computers began in the late fifties(50s). The computers were used in United States for various applications such as census, defence, R&D universities etc.

### **❑ Check Your Progress – 1 :**

1. \_\_\_\_\_ is considered as the first computer of the world.  
[A] Pascaline      [B] Abacus      [C] Tablet      [D] None of these

2. Scientist \_\_\_\_\_ has developed first machine which can perform calculations based changing of different gears.  
[A] George Bole [B] Charles Babbage  
[C] Pascal [D] Lady Ada
3. Charles Babbage has developed \_\_\_\_\_.  
[A] Analytical Engine [B] Difference engine  
[C] Both [A] and [B] [D] None of the above
4. \_\_\_\_\_ is the first computer programmer.  
[A] George Bole [B] Charles Babbage  
[C] Pascal [D] Lady Ada

### **1.3 What is Computer ?**

As we have discussed that the original aim to develop computer was to develop a machine which can perform faster arithmetic calculation such as Addition, Subtraction, Multiplication and Division. Today we can perform lot of activities like chat with friend, playing games, watching movies or live streaming match, listening music, sending mails, sharing photos with friends, attending online lectures, seminars or conferences in which there is no computation is involved. So, we can define our todays computer as a – data processor.

#### **1.3.1 Data :**

Data means unstructured raw material and unstructured facts which will provide necessary input to the computer system. For example, Attendance of one student on particular day is data. Details of product sold to one customer on a particular date is a data. Data is unstructured format and cannot provide sufficient knowledge on the basis of that one can take the decision.

#### **1.3.2 Computer or System :**

Computer is an electronic machine which can perform arithmetic and logical operations at very fast speed. It can store the data, process the data and gives fruitful information to the user. In short, a computer system is a data processor which takes data from the user, process it and provides useful information to its user. For example, a food processor takes mango pieces, water, milk, sugar etc. ingredients, process the ingredients well and provide us mango juice, we actually want. Similarly, a system takes data (raw material) from the user, process it by following rules and provide information.

#### **1.3.3 Information :**

Processed data is called information. Information is a structure format of data, which helps us in decision making. Attendance of all students of entire semester in the form of percentage is information. Total month wise sale of particular product of entire year is information.

#### **☐ Check Your Progress – 2 :**

1. \_\_\_\_\_ is an unstructured raw–material and unstructured facts which provides necessary information to the computer system.  
[A] Data [B] System  
[C] Information [D] None of the above

2. \_\_\_\_\_ is a processed data.  
[A] Data [B] System  
[C] Information [D] None of the above
3. \_\_\_\_\_ is also known as data processor, which takes data as an input and produce information.  
[A] Computer [B] Data [C] Information [D] All of the above

#### **1.4 Generations of Computers :**

Generation term is usually characterising the major developments in the world of computers. There is no clear-cut boundary between two generations of the computers. We use the term generation to distinguish between different hardware technologies used in the computer system.

##### **1.4.1 First Generation – Computers :**

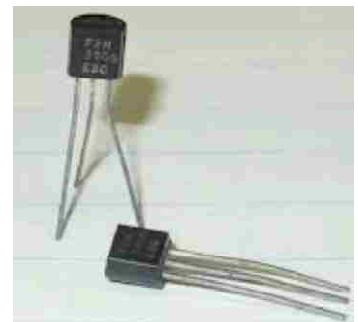
The first electronic computer ENIAC (Electronic Numerical Integrator and Calculator) is developed by Eckert and Mauchly in 1946 in the USA. High-speed vacuum tubes are used as a switching device in it. ENIAC contained more than 20,000 vacuum tubes in it. It weighed more than 30 short tons and consumes 150 kW of energy. It was occupying a room size of space. It could perform 5,000 simple additions or subtractions types of operations or 385 multiplication operations per second. The total cost was about \$487,000, equivalent to \$7,195,000 in 2019. ENIAC could be programmed to perform complex sequences of operations, including loops, branches, and subroutines. However, instead of the stored-program computers that exist today, ENIAC was just a large collection of arithmetic machines, which originally had programs set up into the machine.

##### **1.4.2 Second Generation – Computers :**

First generation computer was based on vacuum tube technology. Because of vacuum tube it was not reliable, consume more energy, took more space and more costly.

In the second generation of the computers in 1959 transistors were used instead of vacuum tubes. Transistors made of germanium semiconductor material and compare to vacuum tubes they were highly reliable. Transistor made switching operations 10 times faster than vacuum tubes. Transistors were smaller in size (one tenth of first generation's vacuum tubes), consumes less electrical consumptions (about one tenth of first generation computers) and was 10 times cheaper than first generation computers.

Magnetic core memories were also developed during this era. Due to the highly reliable larger size of magnetic disk storage development of high-level languages such as FORTRAN (FORmula TRANslation), COBOL (Common Business Oriented Language) are developed during this era.

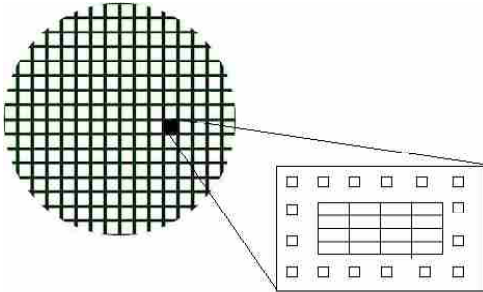


**[Fig : Transistors]**

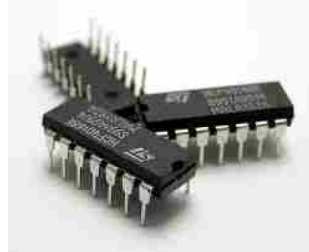
##### **1.4.3 Third Generation – Computers :**

In the Second Generation, transistor has replaced vacuum tubes of First-Generation computers. This change in technology has increased speed, reduced cost and price, and made computers more reliable than that of First-Generation computers. Third generation computers started in 1965 with germanium transistors

being replaced by silicon transistors. Silicon transistors are much smaller in a size and can be placed on small, thin silicon wafer called integrated circuits (IC). IC has been used in the third-generation computer, which is a thin silicon wafer consisting of several electronic components like capacitors, transistors, resistors etc. along with their interconnections. Because of ICs, third-generation computers became much smaller in size, less costly, faster and more reliable.



**[Fig : Wafer and Chip]**



**[Fig : Integrated Circuits (ICs)]**

#### **1.4.4 Fourth Generation – Computers :**

In the fourth-generation (1971–1985) computers emerged with the Large-Scale Integrated Circuits (LSIc) and Very Large-Scale Integrated Circuits (VLSIc) which contains more than 50,000 transistors in a single chip. During fourth-generation microprocessors has been invented, size of the Disk memory is also increased and Floppy disks and Floppy drives are invented. Computers in fourth-generation became more reliable, faster and cheaper. The term Personal Computer (PC) emerge during fourth-generation because of its affordable price and greater speed.

#### **❑ Check Your Progress – 3 :**

1. First-generation computer was based on \_\_\_\_\_ technology.  
[A] Transistors [B] ICs  
[C] Vacuum Tubes [D] All of the above
2. \_\_\_\_\_ technology was used in the second-generation computers.  
[A] SSIc [B] Transistors [C] VLSIc [D] Vacuum Tubes
3. In third-generation computers, \_\_\_\_\_ technology was used.  
[A] Integrated Circuits [B] Transistors  
[C] Vacuum Tubes [D] None of the above
4. Transistors are made from \_\_\_\_\_ material(s).  
[A] Germanium [B] Silicon  
[C] Both [A] and [B] [D] Metals
5. Germanium and Silicon are \_\_\_\_\_ type of material.  
[A] Good conductor [B] Insulator  
[C] Semi-conductor [D] None of the above

#### **1.5 Classification of Computers :**

According to the size and functioning, computers can be classified into following categories :

- Micro Computers
- Mini Computers

- Mainframe Computers
- Super Computers

### **1.5.1 Micro Computers :**

In late 1970, microcomputers were originated. The first microcomputers were built with 8-bit microprocessor chip. Intel 8080, MOS 6502 and MC 6809 are examples of microcomputers. A microcomputer is based on a microprocessor chip called CPU (Central Processing Unit). The microcomputer consists of a microprocessor, semiconductor memories like RAM (Random Access Memory) and ROM (Read Only Memory) to process the data. In early 1980s 16-bits CPU chips (called Intel 8086 and Intel 8088) were introduced by Intel corporation. 8088 has 8/16-bit chip with 8 bits path to move the data between primary memory (chip) and secondary storage and processor can internally process 16 bits of data. 8086 was 16/16-bit chip with 16-bits of external data movement path between primary and secondary memories and 16-bit of processing capabilities.

Intel 80286 has been introduced with 16/32-bit chip and it can support up to 16MB of primary storage. Recent computers have 64-bits microprocessor chip. General purpose computers which, we are using for our day to day lives, for example PCs and Laptops are examples of microcomputers.

### **1.5.2 Mini Computers :**

A minicomputer is a small general-purpose computer. Minicomputer is more powerful in terms of processing speed than microcomputer. Minicomputer is a small but expensive machine with limited Input/Output support. Minicomputers are mainly design to support multitasking, where multiple users can work simultaneously with the system.

### **1.5.3 Mainframe Computers :**

More powerful computers than minicomputer is generally known as mainframes. The mainframe computers have word length of 32 bits or even more. It can support more than 100 simultaneous users with the time-sharing system. It supports varieties of programming languages. Mainframes are costly computers and larger in size compare to minicomputer and microcomputers. Popular mainframe series computers are : MEDHA, Superry, ICL, DEC etc.

### **1.5.4 Super Computers :**

Super computers are most powerful machine. Super computers are very large in size and having very high processing speed. Generally, it is used for complex scientific computation. Super computers are very costly and price range of super computers ranging from 4 Million to 17 Million of US \$. CRAY XMP, ETA, IBM 3090, NEC and HITACHI S-Series computers are examples of it. Supercomputers can perform more than 25,000 million arithmetic operations per second. India has also developed its own supercomputer named PARAM.

#### **❑ Check Your Progress – 4 :**

1. \_\_\_\_\_ is a Super Computer of India.  
[A] MEDHA [B] DEC [C] SIERRA [D] PARAM
2. Our PCs or Laptops comes under \_\_\_\_\_ computer category.  
[A] Micro [B] Mini [C] Mainframe [D] Super
3. Intel 80286 is \_\_\_\_\_ bits computer.  
[A] 8/8 [B] 8/16 [C] 16/16 [D] 16/32

## **1.6 Types of Computer :**

A computer is an electronic device, operating under the control of instructions stored in the own memory, that can accept data (input), process the data according to specified rules, produces information (output), and store the information for future use. Computer contains many electronic and mechanical components known as hardware.

Electronic components in computers process data using instructions, which are the steps that tell the computer how to perform particular task.

A collection of related instructions organized for a common purpose is referred to as software or a program.

One popular category of computer is the personal computer. A personal computer (PC) is a computer that can perform all of its input, processing, output and storage activities by itself.

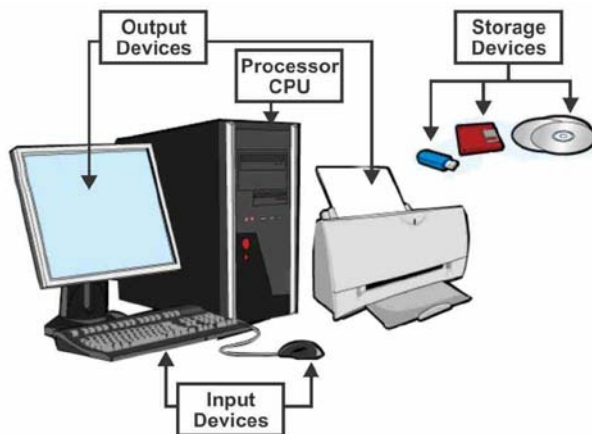
Types of personal computers includes laptop, tablets and desktops. Laptop and tables are sometimes called mobile computers. A mobile computer is a portable personal computer, designed so that a user can carry it from place to place.

### **1.6.1 Desktops and All-In-One Computer :**

A desktop, or desktop computer, is a personal computer designed to be in a stationary location, where all of its components fit on or under a desk or table.

On many desktops, the screen is housed in a display device (Monitor) that is separate from a tower (Cabinet), which is a case that contains the processing circuitry.

Another type of desktop called an all-in-one does not contain a tower and instead uses the same case to house the display and the processing circuitry.



**[Fig : Desktop Computer]**



**[Fig : All-in-One Computer]**

### **1.6.2 Laptop Computer :**

A laptop, is called a notebook computer, is a thin, lightweight mobile computer with a screen in its lid and a keyboard in its base. It is designed to fit on our lap and easy transport, most laptops weight up to 7 pounds (3.1 Kg). It is less than one inch thick. Most laptops can operate on batteries or a power supply or both. Latest Laptop computers comes with built-in speakers, a web-camera and touchpad as a pointing device. Because of Laptop computers has built-in Wi-Fi circuitry, it can connect to wireless network.

### **1.6.3 Tablets :**

Tablets are usually smaller than a laptop but larger than a mobile phone device. A tablet is a thin, lightweight mobile computer that has a touch screen. A popular style of tablet is the slate, which does not contain a physical keyboard. Like laptops, tablets run on batteries or power supply or both. Latest tablets are equipped with Bluetooth, and Wi-Fi connectivity. It has virtual keyboard for text input. Some tablets provide calling features like smart phones, Messaging etc. They are called Phablet, a combination of Phone and Tablets.

### **1.6.4 E-Book Reader :**

An e-book reader or e-reader, is a mobile device that is used primarily for reading e-books. An e-book or digital book, is an electronic version of a printed book, readable on computers and other digital devices.

In addition to books, we can purchase and read other forms of digital media such as newspapers and magazines. Most e-book reader models have a touch screen, and some are Internet capable.

### **1.6.5 Servers :**

A server is a computer dedicated to providing one or more services to other computers or devices on a network. A network is a collection of computers and devices connected together, often wirelessly.

Services provided by servers include storing content and controlling access to hardware, software, and other resources on a network.

A server can support from two to several thousand connected computers and devices at the same time. Servers are available in a variety of sizes and types for both small and large business applications.

### **1.6.6 Wearable Devices :**

A wearable device or wearable is a small, mobile computing consumer device designed to be wore. These devices often communicate with a mobile device or computer. Wearable devices include activity tracker, smartwatches, and smart glasses. Activity tracker monitors heart rate, measure pulse, count steps, and track sleep patterns.

In addition to keeping time, a smartwatch can communicate with smart phone to make and answer phone calls, read and send messages, access the web, play music, work with apps, such as fitness tracker and GPS, and more.

With smart glasses, a user looks into eyeglass-type device to view information or take photos and videos that are projected to a miniature screen in the user's field of vision.



**❑ Check Your Progress – 5 :**

- \_\_\_\_\_ is a light weight portable computer.  
[A] Desktop [B] Laptop [C] All-in-one [D] All or the above
- Laptop computers are also known as \_\_\_\_\_.  
[A] Desktop [B] Tablet [C] Notebook [D] All-in-one
- A powerful machine, provides services to other devices are called \_\_\_\_\_.  
[A] Clients [B] Servers [C] PCs [D] Laptops

**1.7 Let Us Sum Up :**

In this chapter we have seen What is Computer ? And How the different technologies have been contributed to the development of our modern computers. We have discussed generations of the computers, and technology dominating to each generation. We have seen that the originally computer is developed for calculation but today it is being used for data processing purpose. We have also discussed the difference between data and information. We have also seen the classification of computer like Micro-Computers, Mini-Computers, Mainframes and Super-Computer. Finally, we have ended our discussion on different types of computers like Desktops, Laptops, Tablets, E-Book reader, Servers and Wearable computing devices.

**1.8 Glossary :**

- PC** : Personal Computer
- GPS** : Global Positioning System
- Wi-Fi** : Wireless Fidelity
- VLSIc** : Very Large-Scale Integration Circuits
- SSIc** : Small-Scale Integration Circuits

**1.9 Suggested Answers For Check Your Progress**

**❑ Check Your Progress 1 :**

1. [A]          2. [C]          3. [C]          4. [D]

**❑ Check Your Progress 2 :**

1. [A]          2. [C]          3. [A]

**❑ Check Your Progress 3 :**

1. [C]          2. [B]          3. [A]          4. [C]          5. [C]

**❑ Check Your Progress 4 :**

1. [D]          2. [A]          3. [A]

**❑ Check Your Progress 5 :**

1. [B]          2. [C]          3. [B]

**1.10 Assignment :**

- List the advantages of the computers.
- List all disadvantages of the computers.

**1.11 Activity :**

1. Make a list of 10 super computers and note–down important features of it.

**1.12 Case Study :**

Collect at–least 15 features of the smart phone you are using and note down all those features.

**1.13 Further Reading :**

1. Computer Fundamentals by P.K.Sinha and Priti Sinha.
2. Discovering Computers 2016 by Shelly Cashman Series. CENGAGE publications.
3. Computer Fundamentals by Pearl Software, Khanna Book Publishing.