CHAPTER – 1

INTRODUCTION TO COMPUTER

1.1 What is COMPUTER

The term "computer" is derived from Latin word "computare" which means to calculate.

"A computer is a general purpose electronic device that is used to perform arithmetic and logical operations automatically. A computer consists of a central processing unit and some form of memory."

**COMPUTER = Arithmetical Logical Unit (ALU) + Control Unit (CU)**

1.2 Working Principle of a Computer (I-P-O Cycle)

| Input	Process	Output
What we give	What we done	What we get
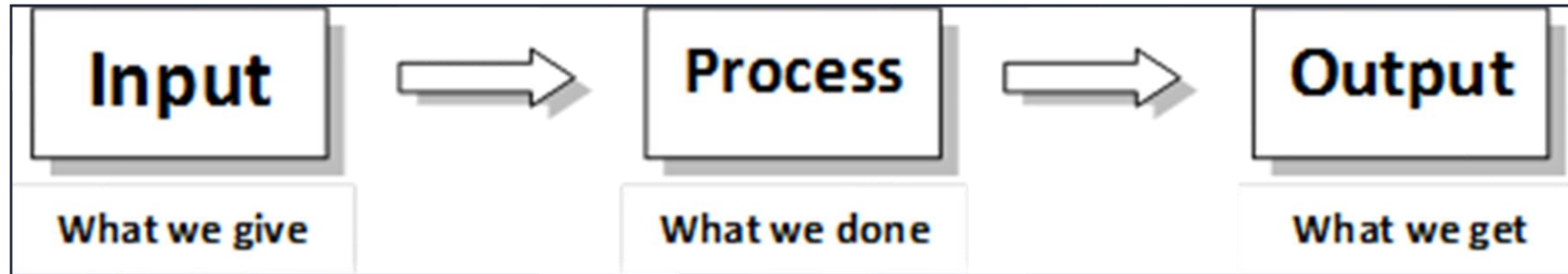
Input-Process-Output (Storage) - IPO(S) model

- ❑ **Program receives an input, from an input device (e.g. keyboard, mouse, disk, etc.)**
- ❑ **Performs some processing on the input**
- ❑ **Produces an output to an output device (e.g. screen, printer, etc.)**

Input → Process → Output
Process ↕ Storage
Feedback
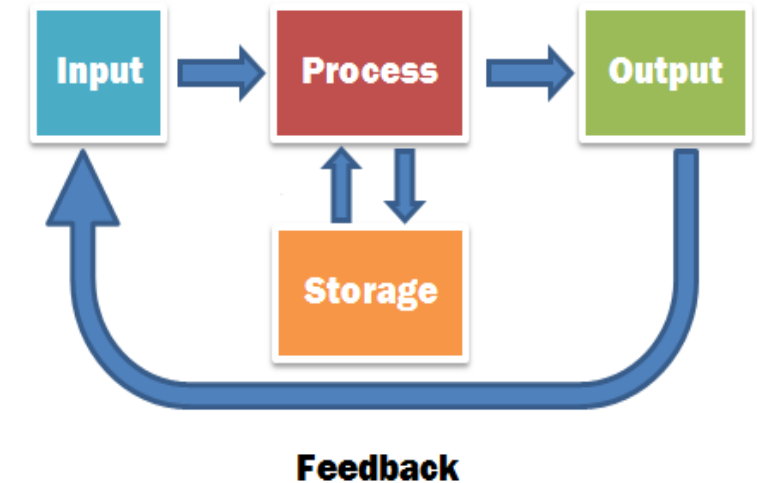
1.3 Characteristics of COMPUTER

- ❑ **Speed**
- ❑ **Reliability**
- ❑ **Accuracy**
- ❑ **Diligence**
- ❑ **Memory**
- ❑ **Logical**
- ❑ **Versatility**
- ❑ **Automation**
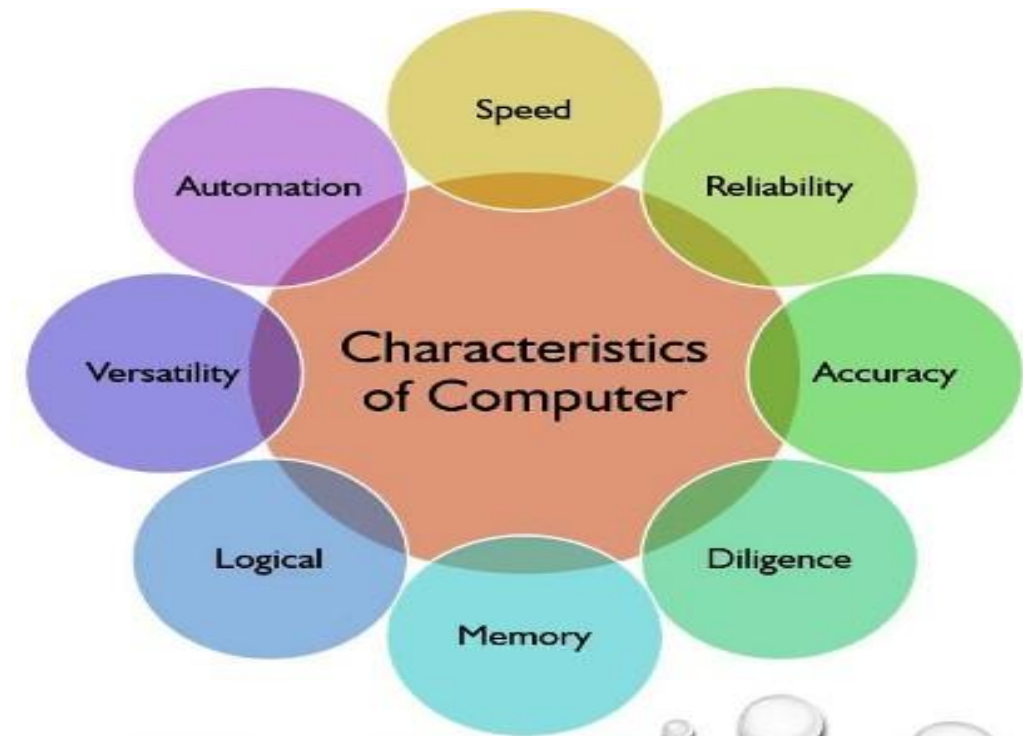
"Commonly Operated Machine Particularly Used in Technical and Educational Research"

C - Commonly
O - Operated
M - Machine
P- Particularly
U- Used
T - Technical
E - Educational
R - Research

Abacus :
The history of computer begins with the birth of abacus which is believed to be the first computer.

Napier's Bones :
it was a manually-operated calculating device which was invented by John Napier (1550-1617) of Merchiston.

Pascaline :
Pascaline is also known as Arithmetic Machine or Adding Machine. It was invented between 1642 and 1644 by a French mathematician-philosopher Biaise Pascal.
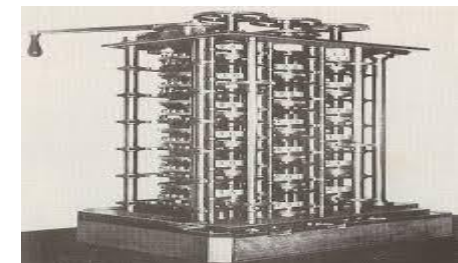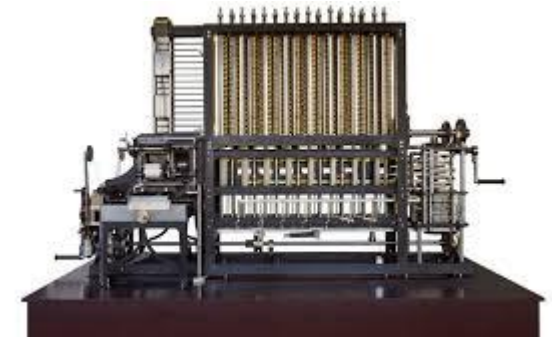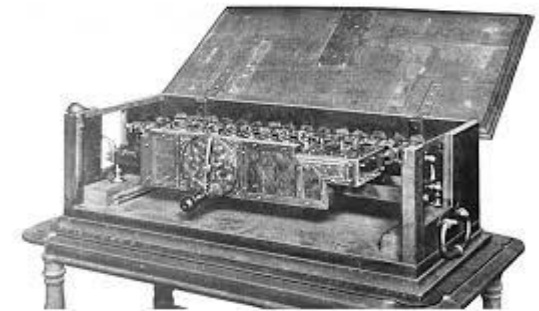
Stepped Reckoner or Leibnitz wheel :
It was developed by a German mathematician-philosopher Gottfried Wilhelm Leibnitz in 1673.

Difference Engine :
In the early 1820s, it was designed by Charles Babbage who is known as "Father of Modern Computer".

Analytical Engine :
This calculating machine was also developed by Charles Babbage in 1830.

Tabulating Machine :
It was invented in 1890, by Herman Hollerith, an American statistician. It was a mechanical tabulator based on punch cards. It could tabulate statistics and record or sort data or information.

Differential Analyzer :
It was the first electronic computer introduced in the United States in 1930.

Mark I :
The next major changes in the history of computer began in 1937 when Howard Aiken planned to develop a machine that could perform calculations involving large numbers.

Computer Generation

First generation (1940 - 1956)

The first generation of computers used vacuum tubes as a major piece of technology.

Second generation (1956 - 1963)

The second generation of computers saw the use of transistors instead of vacuum tubes.

Vacuum Tubes

Transistors

Third generation (1964 - 1971)

The third generation of computers introduced the use of integrated circuits (IC) in computers.

Fourth generation (1972 - 2010)

The fourth generation of computers took advantage of the invention of the microprocessor, more commonly known as a CPU.

Integrated Circuit

microprocessor
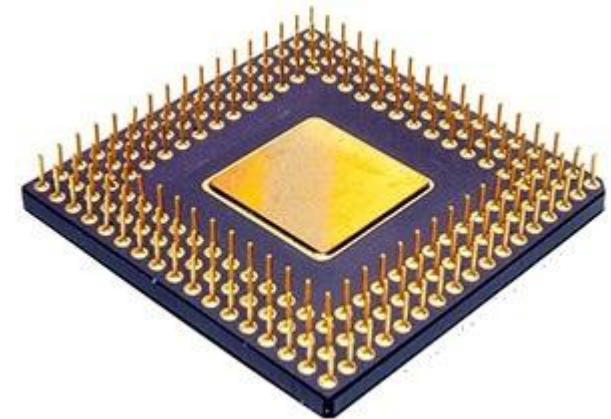
Fifth generation (2010 to present)

The fifth generation of computers is beginning to use artificial intelligence (AI), an exciting technology that has many potential applications around the world.

1.7 Basic Applications of Computer

- ❑ **Notepad**
- ❑ **Calculator**
- ❑ **MS Office**
- ❑ **MS Paint**
- ❑ **Basic Games**
- ❑ **Window Media Player**
- ❑ **WordPad**
- ❑ **Command Prompt**

2 Components of Computer System

2.1 Main computer components

- ❑ **Input Devices**
- ❑ **CPU**
- ❑ **Output Devices**
- ❑ **Primary Memory**
- ❑ **Secondary Memory**

Primary Memory (RAM)

Input devices → Central Processing Unit (CPU) → Output devices

Secondary Memory or Storage (Hard Disk)

❑ **Inputting :** It is the process of entering raw data, instructions and information into the computer. It is performed with the help of input devices.

❑ **Storing :** The computer has primary memory and secondary storage to store data and instructions. It stores the data before sending it to CPU for processing and also stores the processed data before displaying it as output.

❑ **Processing :** It is the process of converting the raw data into useful information. This process is performed by the CPU of the computer. It takes the raw data from storage, processes it and then sends back the processed data to storage.

2.2 Continue…….

❑ **Outputting :** It is the process of presenting the processed data through output devices like monitor, printer and speakers.

❑ **Controlling :** This operation is performed by the control unit that is part of CPU. The control unit ensures that all basic operations are executed in a right manner and sequence.
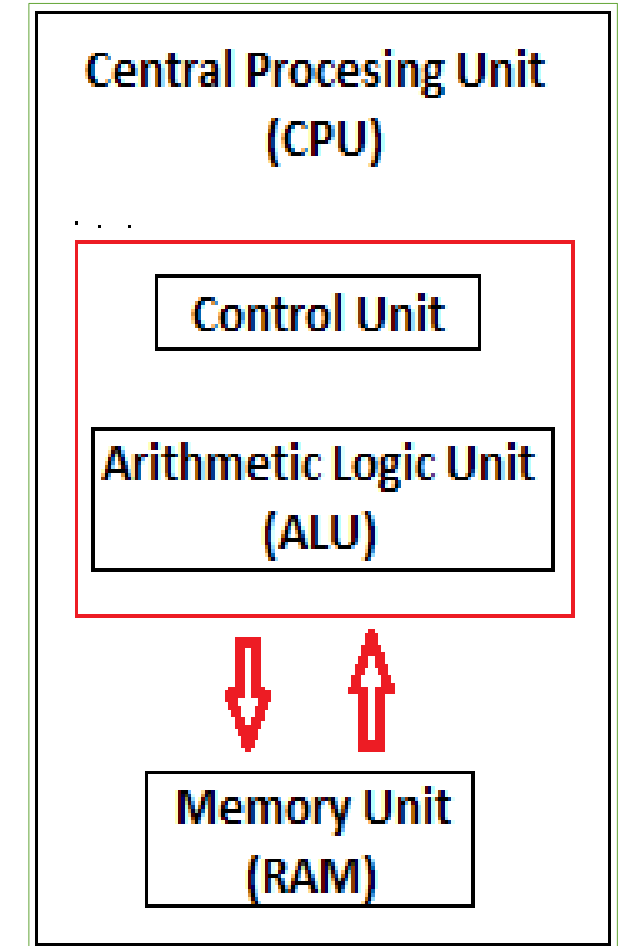
2.3 Central Processing Unit (CPU)

Central processing unit carries out all important functions of a computer. It receives instructions from both the hardware and active software and produces output accordingly.

Generally, a CPU has three components

Memory : It is called Random access memory (RAM). It temporarily stores data, programs and intermediate and final results of processing.

Control Unit : It controls and coordinates the functioning of all parts of computer. It does not involve in processing and storing data.

ALU : It performs arithmetic and logical functions. Arithmetic functions include addition, subtraction, multiplication and division. Logical functions mainly include selecting, comparing and merging the data.

Central Procesing Unit
(CPU)

Control Unit

Arithmetic Logic Unit
(ALU)

Memory Unit
(RAM)

2.4 Input Devices

Input device enables the user to send data, information or control signals to computer. Central processing unit of computer receives the input and processes it to produce output.

Some of the popular input devices are-

- ❑ **Keyboard**
- ❑ **Mouse**
- ❑ **Scanner**
- ❑ **Joystick**
- ❑ **Light Pen**
- ❑ **Track ball**
- ❑ **Microphone**
- ❑ **Touch Pad**
- ❑ **Digital Camera**

2.5 Output Devices

Output device displays the result of processing of raw data that is entered in computer through an input device. There are number of output devices that display output in different ways such as text, images, hard copies and audio or video.

Some of the popular output devices are-

- ❑ **Monitor**
- ❑ **Printer**
- ❑ **Webcam**
- ❑ **Microphone**
- ❑ **Headphone**

2.3 Computer Memory

Memory is the most essential element of a computing system because without it computer can't perform simple tasks. The computer memory holds the data and instructions needed to process raw data and produce output.

Types of Memory-

❑ **Primary Memory / Volatile Memory :**
Primary Memory holds the data and instruction on which computer is currently working. Primary Memory is nature volatile. It means when power is switched off it lost all data.

❑ **Secondary Memory / Non Volatile Memory :**
Secondary Memory is used to store the different programs and the information permanently. Secondary Memory is nature non volatile. It means data is stored permanently even if power is switched off.

Figure 4.2.7
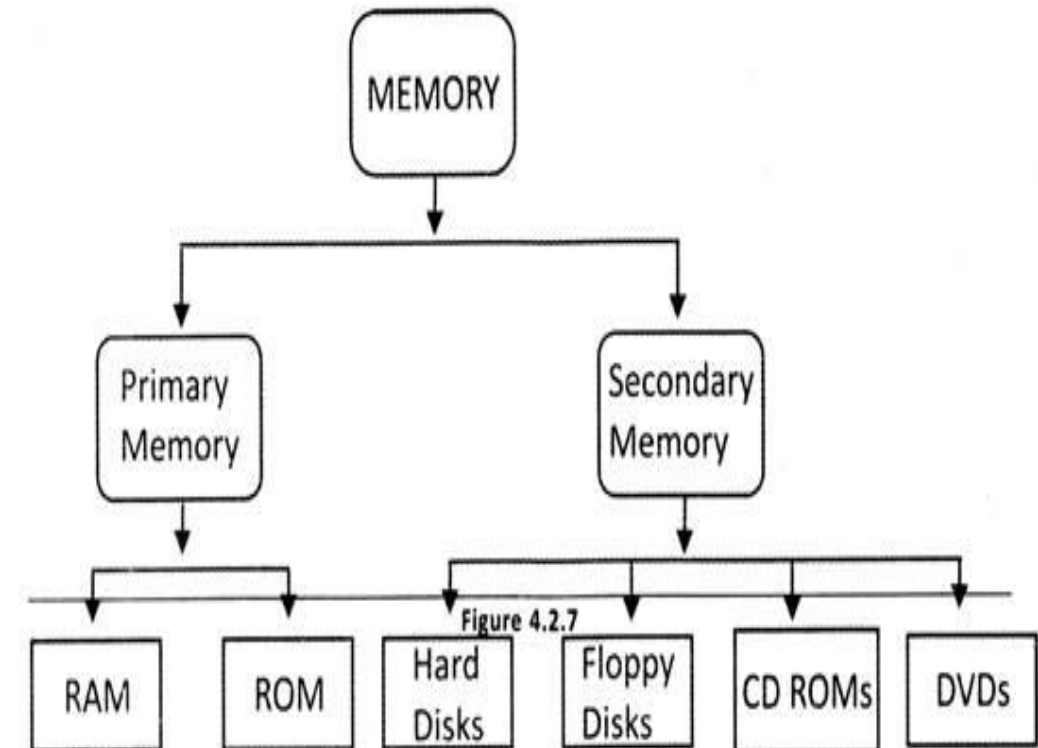
Types of Primary Memory :

Primary memory is generally of two types.
- ☐ **RAM**
- ☐ **ROM**

1) RAM

"It stands for Random Access Memory. It is a temporary memory. The information stored in this memory is lost as the power supply to the computer is switched off. That's why RAM is also called "Volatile Memory"

Types of RAM :   RAM is also of two types:

- ☐ **Static RAM**
- ☐ **Dynamic RAM**

1) ROM

It stands for Read Only Memory. ROM is a Permanent Type memory. Its content are not lost when power supply is switched off. Content of ROM is decided by the computer manufacturer and permanently stored at the time of manufacturing. It is also called "Non-Volatile Memory".

Type of ROM : ROM memory is three types names are following:

❑ PROM(Programmable Read Only Memory)-
❑ EPROM (Erasable Programmable Read Only Memory)-
❑ EEPROM (Electrically Erasable Programmable Read Only Memory)

Secondary Memory / Non Volatile Memory–

Secondary Memory is external memory of the computer. It is also known as Auxiliary memory and permanent memory. It is used to store the different programs and the information permanently. Secondary Memory is nature non volatile. It means data is stored permanently even if power is switched off.

Secondary Memory / Non Volatile Memory–

The secondary storage devices are :

❑ Floppy Disks
❑ Magnetic (Hard) Disk
❑ Magnetic Tapes
❑ Pen Drive
❑ Hard Disk
❑ Optical Disk(CD,DVD)

Flash Floppy Disk Zip Disk CD + RW

CD + R DVD + RW DVD + R Storage Tape

Smart Media Removable Hard – Drive Micro Drive Memory Stick

Secondary Storage Devices

Smart Cards Online Storage Site PC Card

3 Concept of Hardware and Software

3.1 Hardware

All tangible physical components of computer and the devices connected to it are hardware. Some of the popular examples of computer hardware are CPU, motherboard, monitor, mouse and keyboard.
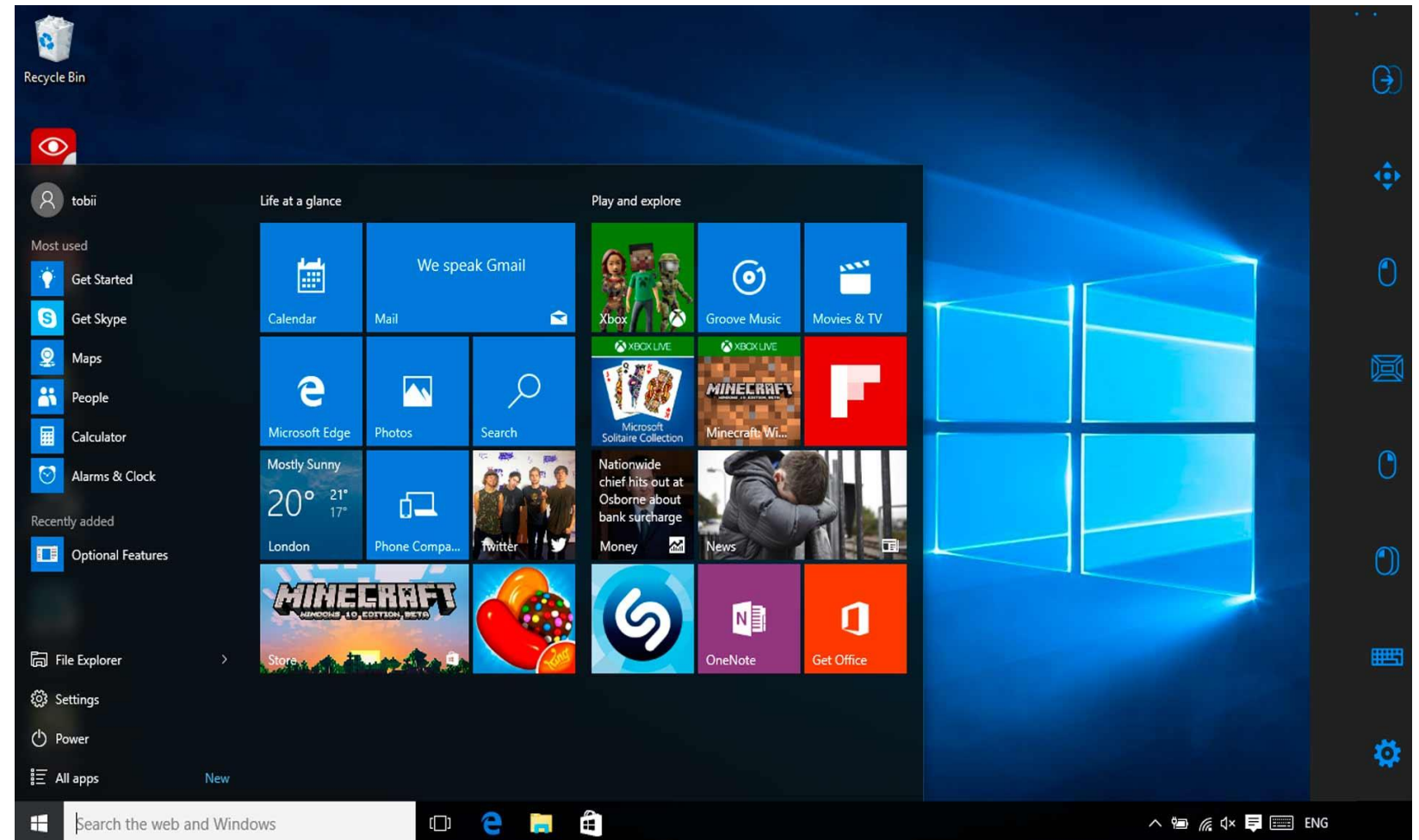
Example :

- ❑ Motherboard
- ❑ Monitor
- ❑ Keyboard
- ❑ Mouse

HARDWARE

3.2 Software

It is a set of programs that enables the hardware to perform a specific task. All the programs that run the computer are software.

Types of Software

□ **System Software :**

System software is the main software that runs the computer. When you turn on the computer it activates the hardware and controls and coordinates their functioning. The application programs are also controlled by system software. Like Operating system

□ **Application Software :**

Applications software is a set of programs designed to perform a specific task. It does not control or coordinate the working of computer. Application software can be easily installed or uninstalled as required. Like Microsoft Office Suite

3.3 Programming language

- ❑ A programming language is a vocabulary and set of grammatical rules for instructing a computer or computing device to perform specific tasks.
- ❑ The term programming language usually refers to high-level languages,
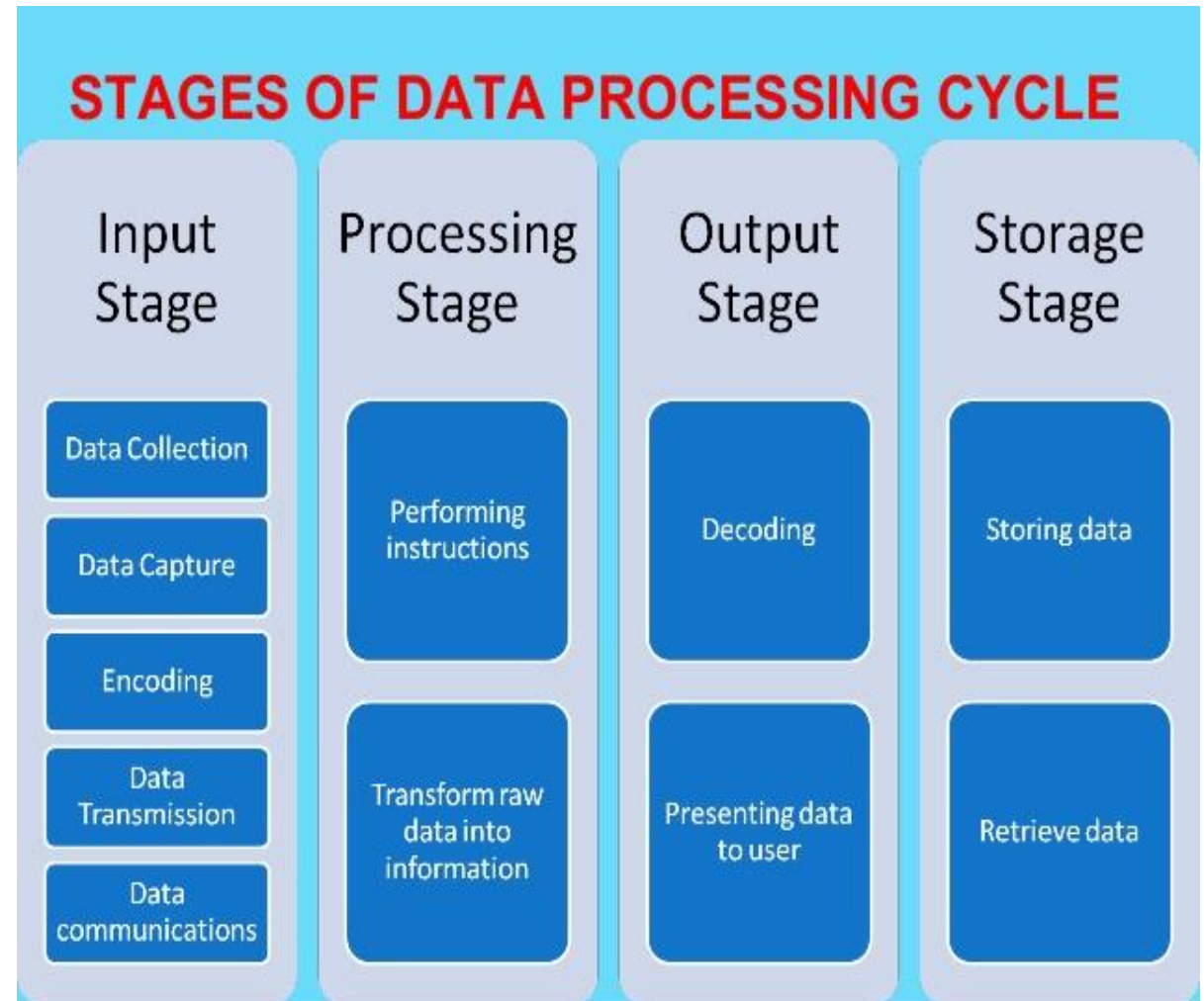- ❑ such as BASIC, C, C++, COBOL, Java, FORTRAN, Ada, and Pascal.

Following are the major categories of Programming Languages :

- ❑ Machine Language
- ❑ Assembly Language
- ❑ High Level Language
- ❑ System Language
- ❑ Scripting Language

Data processing

Data processing, Manipulation of data by a computer. It includes the conversion of raw data to machine-readable form, flow of data through the CPU and memory to output devices, and formatting or transformation of output. Any use of computers to perform defined operations on data can be included under data processing.

STAGES OF DATA PROCESSING CYCLE

Input Stage	Processing Stage	Output Stage	Storage Stage
Data Collection	Performing instructions	Decoding	Storing data
Data Capture			
Encoding			
Data Transmission	Transform raw data into information	Presenting data to user	Retrieve data
Data communications			

Representation of data/Information

Data & Information

- Data is any collection of numbers, characters or other symbols that has been coded into a format that can be input into a computer and processed.
- Data on its own has no meaning, or context.
- It is only after processing by a computer that data takes on a context and becomes information.
- There are many types of data
- All data ends up being stored as a series of numbers inside the computer.
- Data can be input to the computer by the user in many different ways.
- The main types of data that can be input into a computer and processed are numeric, text, dates, graphics and sound.

Basic Data Type

Type	Range		Bytes	Represents
Char/short	ASCII-128	127	1	Character
Unsigned char	ASCII 0	255	1	Character
int	-32,768	32,767	2	Whole numbers
Unsigned int	0	65,535	2	Whole numbers
long	-2,147,438,648	2,147,438,647	4	Whole numbers
Unsigned long	0	4,294,967,295	4	Whole numbers
float	3.4×10^{-38}	3.4×10^{38}	4	Fractional numbers
double	1.7×10^{-308}	1.7×10^{308}	8	Fractional numbers
Long double	3.4×10^{-4932}	3.4×10^{4932}	10	Fractional numbers

Storage of Data

- ❑ **Hard Disk**
- ❑ **Compact Disk (CD)**
- ❑ **Digital Video Disk (DVD)**
- ❑ **Pen drive**
- ❑ **Memory Cards**

DATA PROCESSING METHODS

1. Manual Data Processing

In this method data is processed manually without the use of a machine, tool or electronic device. Data is processed manually, and all the calculations and logical operations are performed manually on the data.

2. Mechanical Data Processing

Data processing is done by use of a mechanical device or very simple electronic devices like calculator and typewriters.

3. Electronic Data Processing

This is the modern technique to process data. The fastest and best available method with the highest reliability and accuracy. The technology used is latest as this method used computers and employed in most of the agencies.

E-governance

In 1977, the National Informatics Centre (NIC) was set up as first major step towards e-Governance. E-governance is the application of information and communication technologies to transform the efficiency, effectiveness, transparency and accountability of informational and transactional exchanges with in government, between government & govt. agencies of National, State, Municipal and Local levels, citizen & businesses, and to empower citizens through access & use of information. (Information Electronics and Communication Technology)

Stages of e-Governance

With respect to India, e-Governance proceeded through the following phases :

Computerization :

This first phase was characterized by the use of computers in a large number of Government offices.

Networking :

In this phase, few government organizations got connected through a hub which facilitated sharing of information and flow of data between different government entities.

On-line presence :

In this phase, the government entities began to maintain websites containing information about the organizational structure, contact details, reports and publications, objectives and vision statements.

On-line interactivity :

Online interactivity began between government entities and the citizens, civil society organizations etc. It also minimized the cope of personal interface with government entities by providing downloadable Forms, Instructions, Acts, Rules etc.

Types of Interactions in e-Governance

- ❑ **G2G (Government to Government)**

- ❑ **G2C (Government to Citizens)**

- ❑ **G2B (Government to Business)**

- ❑ **G2E (Government to Employees)**

Multimedia

A Multimedia Application is an Application which uses a collection of multiple media sources

Example :

❑ Text
❑ Graphics
❑ Images
❑ Sound/Audio
❑ Animation and/or Video

Entertainment

Entertainment is a form of activity that holds the attention and interest of an audience, or gives pleasure and delight. It can be an idea or a task, but is more likely to be one of the activities or events that have developed over thousands of years specifically for the purpose of keeping an audience's attention.

There are various kinds of entertainment for particular tastes, as :
- ❑ Cinema
- ❑ Theatre
- ❑ Sports
- ❑ Games
- ❑ Concert
- ❑ Comedy shows etc.

SUMMARY

In this Chapter you learned

- ❏ What is Computer?
- ❏ Computer Generations
- ❏ History of computer
- ❏ Input & Output Devices
- ❏ Memory
- ❏ Applications of IECT
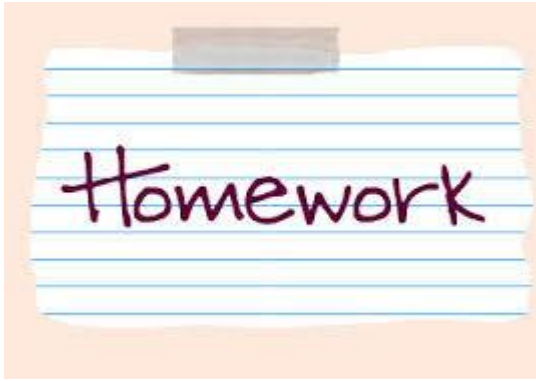
Q 1.What is primary and secondary memory?

Q 2.What is the principle of computer?

Q 3. What is the current computer generation?

Q 4. Printer is an output device or input device?

Q 5.What is software?

Homework

Q 1. Write IPO cycle definition with diagram ?

Q 2. Write about all computer generations ?

Q 3. Write all the components of the computer ?

Q 4. Write the name of input and output devices ?

Q 5. Explain all type of computer memories?

Q 6. Explain hardware and software?

Q 7. Explain e-governance?