Computer fundamental
UNIT: 1 INTRODUCTION TO COMPUTER

1. WHAT IS COMPUTER?

- The word "computer" is comes from the word "TO COMPUTE" means to calculate.
- A computer is normally considered to be a calculation device which can perform the arithmetic operations very speedily.
- A computer may be defined as a device which operates upon the data.
- Data can be in the form of numbers, letters, symbols, size etc. And it comes in various shapes & sizes depending upon the type of computer application.
- A computer can store, process & retrieve data as and when we desired.
- The fact that computer process data is so fundamental that many people have started calling as "Data Processor".
- A computer first it gets the Data, does Process on it and then produces Information.

DATA	→	PROCESS	→	INFORMATION

- DEFINATION OF COMPUTER
  - A computer is an electronic device which takes input from the user, processes it and gives the output as per user's requirement.
  - So the main tasks of performed by the computer are:
    - Input
    - Process
    - Output

2. WRITE DOWN THE CHARACTERISTICS OF COMPUTER

Some important characteristics of the computer are as follow:
- Automatic:
  - Computers are automatic machines because it works by itself without human intervention.
  - Once it started on a job they carry on until the job is finished.
  - Computer cannot start themselves.

- They can works from the instructions which are stored inside the system in the form of programs which specify how a particular job is to be done.

- **Accuracy:**
  - The accuracy of a computer is very high.
  - The degree of accuracy of a particular computer depends upon its design.
  - Errors can occur by the computer. But these are due to human weakness, due to incorrect data, but not due to the technological weakness.

- **Speed:**
  - Computer is a very fact device. It can perform the amount of work in few seconds for which a human can take an entire year.
  - While talking about computer speed we do not talk in terms of seconds and milliseconds but in microseconds.
  - A powerful computer is capable of performing several billion (10^9) simple arithmetic operations per second.

- **Diligence:**
  - Unlike human beings, a computer is free from monotony, tiredness & lack of concentration.
  - It can continuously work for hours without creating any error & without grumbling.
  - If you give ten million calculations to performed, it will perform with exactly the same accuracy & speed as the first one.

- **Versatility:**
  - It is one of the most wonderful features about the computer.
  - One moment it is preparing the results of a particular examination, the next moment it is busy with preparing electricity bills and in between it may be helping an office secretary to trace an important letter in seconds.

- **Power of remembering:**
  - Computer can store and recall any amount of data because of its high storage capacity of its storage devices.
  - Every piece of information can be retained as long as desired by the user and can be recalled as and when required.
  - Even after several years, if the information recalled, it will be as accurate as on the day when it was filled to the computers.

- **No I.Q.**
  - A computer is not a magical device; it processes no intelligence of its own.
 - Its I.Q. is zero.

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- o **It has to be told what to do & in what sequence.**
- o **It cannot take its own decision.**

- **No Fallings:**
  - o **A Computer has no feelings because they are machines.**
  - o **Based on our feelings, task, knowledge and experience we often make certain judgments in our day today life.**
  - o **But Computer goes exactly the way which we have given the instructions**.

3. EXPLAIN THE DATA PROCESSING CYCLE OF COMPUTER.

- **The computer Data Processing is any process that a computer program does to enter data & summarise, analyse or convert data into useable information.**
- **The process may be automated & run on a computer.**
- **It involves recording, analysing, storing, summarising & storing data.**
- **Because data are most useful when it is well presented & informative.**

The Data Processing Cycle:

- **Data Processing cycle described all activities which are common to all data processing systems from manual to electronic systems.**
- **These activities can be grouped in four functional categories, viz., data input, data processing, data output and storage, constituting what is known as a data processing cycle.**
- **The main aim of data processing cycle is to convert the data into meaningful information.**
- **Data processing system are often referred to as Information System.**
- **The Information System typically take raw Data as Input to produce Information as Output.**
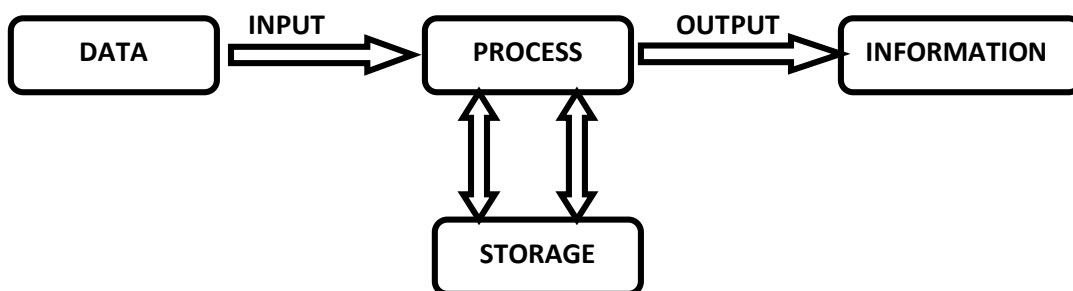
- **The data processing cycle contains main four functions:**
  - o **Data input**

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- o **Data process**
- o **Data storage**
- o **Data output**
- **DATA INPUT**
  - o **The term input refers to the activities required to record data.**
  - o **It's a process to entered data in to computer system.**
  - o **So before we input any data, it is necessary to check or verify the data context.**
- **DATA PROCESSING**
  - o **The term processing includes the activities like classifying, storing, calculating, comparing or summarising the data.**
  - o **The processing means to use techniques to convert the data into meaningful information.**
- **DATA OUTPUT**
  - o **It's a communication function which transmits the information to the outside world.**
  - o **After completed the process the data are converted into the meaningful in**
  - o **Sometimes the output also includes the decoding activity which converts the electronically generated information into human readable form.**
- **DATA STORAGE**
  - o **It involves the filling of data & information for future use.**

4. EXPLAIN THE CLASSIFICATION OF THE COMPUTER BY DATA PROCESSED

The computers are divided mainly three types on the based on data processed:

1. **Analog computers**
2. **Digital computers**
3. **Hybrid computers**

Analog computers:

- **In Analog Computers, data is represented as continuously varying voltage and operate essentially by measuring rather counting.**
- **As the data is continuously variable, the results obtained are estimated and not exactly repeatable.**
- **It can able to perform multiple tasks simultaneously and also capable to work effectively with the irrational number. E.g. 1/8 = 0.125 and 1/6=0.1666**

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- **Voltage, temperature and pressure are measured using analog devices like voltmeters, thermometers and barometers**.

Digital Computers

- **The digit computer is a machine based on digital technology which represents information by numerical digit.**
- **In Digital Computers data is represented as discrete units of electrical pulses. The data is measured in quantities represented as either the 'on' or 'off' state.**
- **Therefore, the results obtained from a digital computer are accurate.**
- **Virtually all of today's computers are based on digital computers.**

Hybrid Computers

- **It combines the good features of both analog & digital computers.**
- **It has a speed of analog computer & accuracy of digital computer.**
- **Hybrid Computers accept data in analog form and present output also in digitally.**
- **The data however is processed digitally.**
- **Therefore, hybrid computers require analog-to-digital and digital-to-analog converters for output**.

5. EXPLAIN THE CLASSIFICATION OF THE COMPUTER BY DATA PROCESSING:

The computers are classified in four types on the based on data processing.

- **Micro computer**
- **Mini computer**
- **Mainframe computer**
- **Super computer**

Micro Computer:

- **Micro computers are the computers with having a microprocessor chip as it central processing unit.**
- **Originated in late 1970s.**
- **First micro computer was built with 8 bit processor.**
- **Microcomputer is known as personal computer.**
- **Designed to use by individual whether in the form of pc's, workstation or notebook computers.**
- **Small in size and affordable for general people.**
- **Ex: IBM PC, IBM PC/XT, IBM PC/AT**

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Micro Computer:

- **Mini computers are originated in 1960s.**
- **Small mainframes that perform limited tasks.**
- **Less expensive than mainframe computer.**
- **Mini computers are Lower mainframe in the terms of processing capabilities.**
- **Capable of supporting 10 to 100 users simultaneously.**
- **In 1970s it contains 8 bit or 12 bit processor.**
- **Gradually the architecture requirement is grown and 16 and 32 bit.**
- **Minicomputers are invented which are known as supermini computers.**
- **Ex: IBM AS400**

Mainframe Computer:

- **A very powerful computer which capable of supporting thousands of user simultaneously.**
- **It contains powerful data processing system.**
- **It is capable to run multiple operating systems.**
- **It is capable to process 100 million instructions per second.**
- **Mainframes are very large & expensive computers with having larger internal storage capacity & high processing speed.**
- **Mainframes are used in the organization that need to process large number of transaction online & required a computer system having massive storage & processing capabilities.**
- **Mainly used to handle bulk of data & information for processing.**
- **Mainframe system is housed in a central location with several user terminal connected to it.**
- **Much bigger in size & needs a large rooms with closely humidity & temperature.**
- **IBM & DEC are major vendors of mainframes.**
- **Ex : MEDHA, SPERRY, IBM, DEC, HP, HCL**

Super Computer:

- **Most powerful & most expensive computer.**
- **Used for complex scientific application that requires huge processing power.**
- **Used multiprocessor technology to perform the calculation very speedy.**
- **They are special purpose computers that are designed to perform some specific task.**

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- The cost of the super computer is depended on its processing capabilities & configuration.
- The speed of modern computer is measured in gigaflops, teraflops and petaflops.
    - Gigaflops= 109 arithmetic operation per second.
    - Teraflops=1012 arithmetic operation per second.
    - Petaflops=1015 arithmetic operation per second.
- Ex: PARAM , EKA, BLUE GENE/P

6. EXPLAIN THE GENERATION OF THE COMPUTERS.

In Computer language, "Generation" is a set of Technology. It provides a framework for the growth of the computer technology. There are totally Five Computer Generations till today. Discussed as following.

 First Generation:
- Duration: 1942-1955
- Technology: vacuum tube
    - Used as a calculating device.
    - Performed calculations in milliseconds.
    - To bulky in size & complex design.
    - Required large room to place it.
    - Generates too much heat & burnt.
    - Required continuously hardware maintenance.
    - Generates much heat so must air-conditioner rooms are required.
    - Commercial production is difficult & costly.
    - Difficult to configure.
    - Limited commercial use.
    - ENIAC, EDVAC, EDSAC are example of 1st generation computer.

 Second Generation:
- Duration: 1955-1964
- Technology: transistor
    - 10 times Smaller in size than 1st generation system.
    - Less heat than 1st generation computers.
    - Consumed less power than 1st generation system.
    - Computers were done calculations in microseconds.
    - Air-conditioner is also required.
    - Easy to configure than 1st generation computers.

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- More reliable in information.
- Wider commercial use.
- Large & fast primary/secondary storage than 1st generation computers.

Third Generation:

- **Duration:** 1965-1975
- **Technology:** IC chip
  - Smaller in size than 1st & 2nd generation computers.
  - Perform more fast calculations than 2nd generation systems.
  - Large & fast primary/secondary storage than 2nd generation computers.
  - Air –conditioner is required.
  - Widely used for commercial applications.
  - General purpose computers.
  - High level languages like COBOL & FORTAN are allowed to write programs.
  - Generate less heat & consumed less power than 2nd generation computer.

Fourth Generation:

- **Duration:** 1975-1989
- **Technology:** Microprocessor chip
  - Based on LSI & VLSI microprocessor chip.
  - Smaller in size.
  - Much faster than previous generations.
  - Minimum hardware maintenance is required.
  - Very reliable as computer to previous generation computers.
  - Totally general purpose computer.
  - Easy to configure.
  - Possible to use network concept to connect the computer together.
  - NO requirement of air-conditioners.
 - Cheapest in price.

Fifth Generation:

- **Duration:** 1989 to Present
- **Technology:** ULSI microprocessor chip
  - Much smaller & handy.
  - Based on the ULSI chip which contains 100 million electronic components.
  - The speed of the operations is increased.
  - Consumed less power.
  - Air-conditioner is not required.
  - More user friendly interface with multi-media features.
  - High level languages are allowed to write programs.
  - Larger & faster primary/secondary storage than previous generations.

o **Notebook computers are the example of 5th generation computers.**

7. EXPLAIN THE BLOCK DIAGRAM OF COMPUTER OR EXPLAIN THE SIMPLE MODEL COMPUTER.

A simple computer system comprises the basic components like Input Devices, CPU (Central Processing Unit) and Output Devices as under:
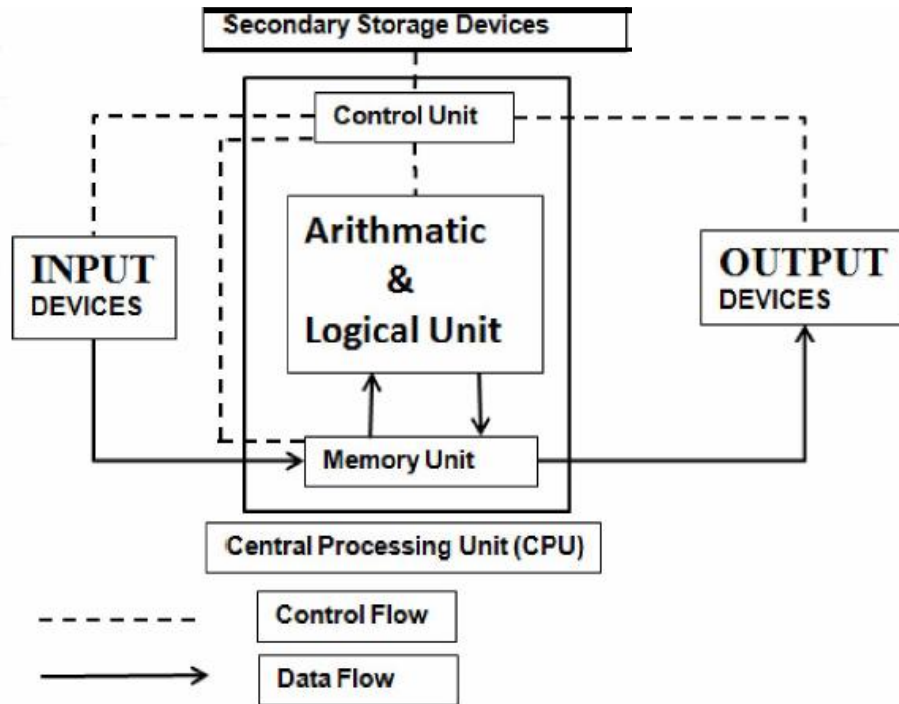
- **Input Devices:**
    - o **The devices which are used to entered data in the computer systems are known as input devices.**
    - o **Keyboard, mouse, scanner, mike, light pen etc are example of input devices.**

    <u>FUNCTION OF INPUT DEVICES</u>
    - o **Accept the data from the outside worlds.**
    - o **Convert that data into computer coded information.**
    - o **Supply this data to CPU for further processing.**
- **Output Devices:**
    - o **The devices which display the result generated by the computer are known as output devices.**
    - o **Monitor, printer, plotter, speaker etc are the example of output devices.**

    <u>FUNCTIONS OF OUTPUT DEVICES</u>
    - o **Accept the result form the CPU.**
    - o **Convert that result into human readable form.**

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o **Display the result on the output device.**

- **Memory Unit:**
    - o **The data & instruction have to store inside the computer before the actual processing start.**
    - o **Same way the result of the computer must be stored before passed to the output devices. This tasks performed by memory unit.**

    FUNCTIONS OF MEMORY UNIT
    - o **Store data & instruction received from input devices.**
    - o **Store the intermediate results generated by CPU.**
    - o **Store the final result generated by CPU.**

- **Arithmetical & Logical Unit:**
    - o **The ALU is the place where actual data & instruction are processed.**
    - o **All the calculations are performed & all comparisons are made in ALU.**
    - o **Performs all arithmetical & logical operations.**
    - o **An arithmetic operation contains basic operations like addition, subtraction, multiplication, division.**
    - o **Logical operations contains comparison such as less than, greater than, less than equal to, greater than equal to, equal to, not equal to.**

- **Control Unit:**
    - o **It controls the movement of data and program instructions into and out of the CPU, and to control the operations of the ALU.**
    - o **In sort, its main function is to manage all the activities within the computer system.**
    - o **Controls the internal parts as well as the external parts related with the computer.**
- **CPU:**
    - o **The Unit where all the processing is done is called as Central Processing Unit.**
    - o **It contains many other units under it.**
    - o **Main of them are:- Control Unit And ALU (Arithmetic & Logic Unit)**