RGPVNOTES.IN

Program : **B.Tech**

Subject Name: **Basic Computer Engineering**

Subject Code: **BT-205**

Semester: **2nd**

NOTES

UNIT-1

What is Computer

The term computer has taken from the computing. A computer can be defined as an electronic device that takes data and instruction from the user as input perform computing and give information as output to the user. Fig.no 1.1.

The electronic device is known as hardware & the set of instruction is known as software.

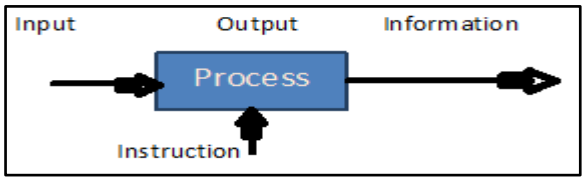


Fig.no 1.1

Basic Computer Operation

1. **INPUT:** It accepts data and instruction through the input device.
2. **PROCESS AND CONTROL:** it performs the action as per the instruction issued and process the given data.
3. **STORAGE:** it stores the data and instruction for future execution.
4. **OUTPUT:** it generates the desired output after executing the instruction and processing the input data.

Advantages of Computer

1. **ACCURACY** Computer performs complex and repetitive calculation with accurate results.
2. **MEMORY** Store large amount of data and information
3. **USER-FRIENDLY** Provide information to the user in many different forms.
4. **FAST** Perform fast execution or processing.
5. **LESS MAN POWER** Manual requirement is less.
6. **BEST RESULTS** Artificial intelligence, Decision-making best results.

CLASSIFICATION OF COMPUTER

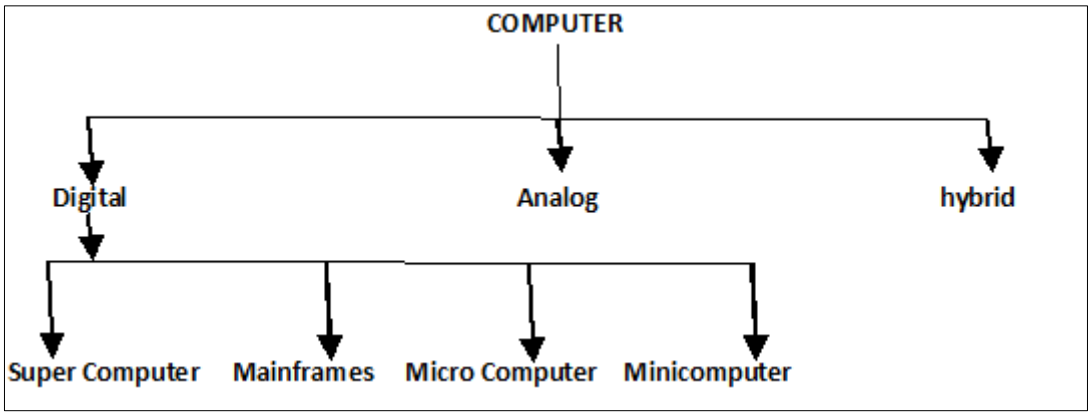


Fig.no 1.2

Analog Computer: As figure 1.2 an **analog computer** is a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved.

Fig.no 1.3

Fig.no 1.4

Digital Computer:

The digital computer works on discontinuous data. They convert the data into digits (binary digits 0 and 1) and all operations are carried out on these digits at extremely fast rates.

A digital computer basically knows how to count the digits and add the digits. Digital computers are much faster than an analog computer and far more accurate.

Supercomputer: A supercomputer contains many CPUs which operate in parallel to make it faster. They are used for massive data processing and solving very sophisticated problems. They are used for weather forecasting, weapons research and development, rocketing, aerodynamics, seismology, atomic, nuclear etc.

MAINFRAME COMPUTERS: Mainframe computers are very powerful, large general-purpose computers. They are used where a large amount of data is to be processed or very complex calculations are to be made and these tasks are beyond the computing capacity of minicomputers. They are used in research organizations, large industries, large business, and government organizations, bank, and airline

Fig.No 1.5

Fig.no 1.6

Fig.no 1.7

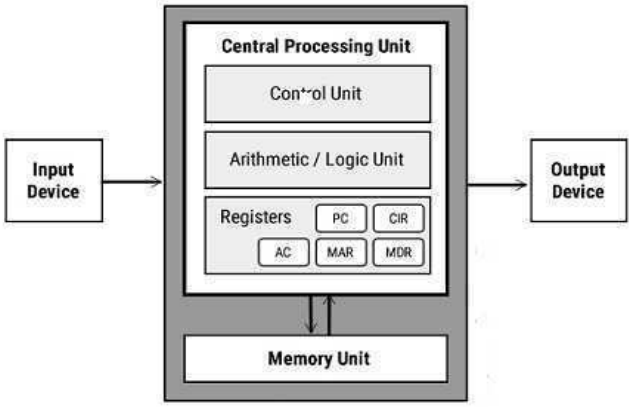
reservations where a large database is required as fig 1.7.

Microcomputers: A Microcomputer is a low-cost, small, digital computer. It contains the microprocessor as its CPU, a memory unit, an input device, and an output device. Microcomputers have a wide range of applications like general purpose calculations, industrial control, home application; Microcomputers are also called personal computers as fig 1.6.

Minicomputers: Minicomputers are faster and more powerful than microcomputers. Minicomputers are general purpose computers, smaller than mainframe and give computing power without adding the prohibitive expenses associated with large systems. They are used in accounting, word processing, database management, statistical packages for social sciences, CAD, and numerical analysis etc as Fig 1.7.

Central Processing Unit

The CPU which is referred to as the brain of a computer is responsible for processing the data inside the computer system. It is also responsible for controlling all other components of computer system.



Block Diagram of a Computer System Fig.no 1.8

Central processing unit (CPU) is the central component of the PC. Sometimes it is called as a processor. It is the brain that runs the show inside the Pc. All work that is done on a computer is performed directly or indirectly by the processor. Obviously, it is one of the most important components of the Pc. It is also, scientifically, not only one of the most amazing parts of the PC but one of the most amazing devices in the world of technology. The processor plays a significant role in the following important aspects of your computer system;

Performance: The processor is probably the most important single determinant of system performance on the Pc. While other components also play a key role in determining performance, the processor's capabilities dictate the maximum performance of a system. The other devices only allow the processor to reach its full potential.

Software Support: Newer, faster processors enable the use of the latest software. In addition, new processors such as the i3/i5/i7 with MMX Technology, enable the use of specialized software not usable on earlier machines.

Reliability and Stability: The quality of the processor is one factor that determines how reliably your system will run. While most processors are very dependable, some are not. This also depends to some extent on the age of the processor and how much energy it consumes. The CPU consists of Control Unit, Arithmetic and Logic Unit (ALU) and register set.

Main Operation of the CPU Includes

1. FETCH: Fetching instruction from the memory issued by the user.
2. DECODE: Decoding the instruction to decide what operation to be performed.
3. EXECUTE: Execute the instruction.
4. STORE: Store the result in the memory.

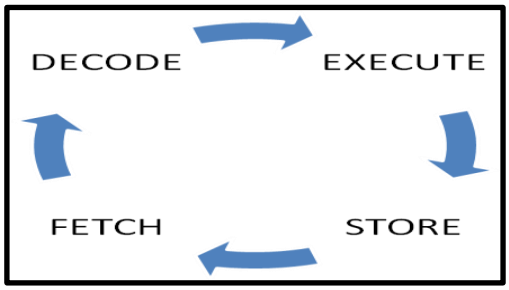


Fig.no 1.9

The structure of CPU:

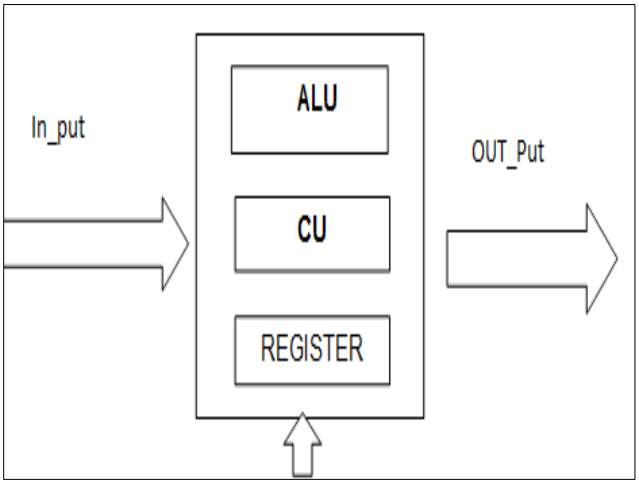


Fig.no 1.10

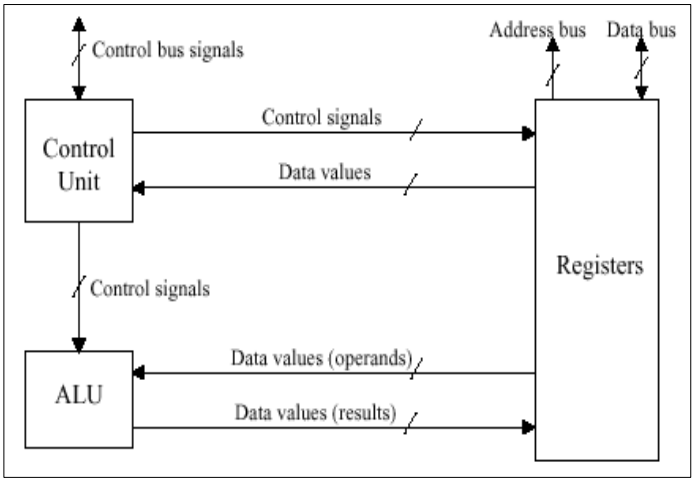


Fig.no 1.11

Arithmetic Logical Unit (ALU)

ALU is the combination of arithmetic unit and logical unit is used to perform an arithmetic operation on the input data (+, -, *, /). Logical unit is used to perform logical operation on input data (<, >, <=, >=, =, OR, NOT, AND)

Control Unit (CU)

CU is an important component that controls the flow of data and information. It is important for the proper execution of the instruction.

Cache Memory

Cache memory is a small fast and expensive memory that stores the copies of data that needs to be accessed frequently from main memory.

Types of Cache memory

Primary Cache: - It is also known as L1 cache or internal cache it is located inside the CPU and provides quick access to the frequently provided data to the microprocessor.

Secondary Cache: - **-** It is also known as L2 cache or External cache it is located outside the CPU and positioned on the motherboard. It is slower as compared to L1.

Register (Memory Unit)

The register is used to quickly accept, store, and transfer data and instructions that are being used immediately by the CPU, there are various types of Registers those are used for various purposes. Register are special purpose high-speed temporary storage area for holding data, address, and instruction during processing of the instruction. The register is always on the CPU.

PC: - The **program counter (PC)** just part of the instruction sequencer in some computers is a processor register. It keeps track of the **next memory address** of the instruction that is to be executed once the execution of the current instruction is completed. **In other words, it holds the address of the memory location of the next instruction when the current instruction is executed.**

AC: -Accumulator: This Register is used for storing the Results those are produced by the System. When the CPU will generate Some Results after the Processing then all the Results will be Stored into the **AC Register**.

IR: - Instruction Register: store the instruction currently being executed.

MAR: - (Memory address register) this register holds the memory addresses of data and instructions. This register is used to access data and instructions from memory during the execution phase of an instruction. Suppose CPU wants to store some data in the memory or to read the data from the memory. It places the address of the required memory location in the MAR.

MBR: - Memory buffer register: -**MBR stands for** Memory Buffer Register**. This register holds the contents of data or instruction read from, or written in the memory. It means that this register is used to store data/instruction coming from the memory or going to the memory.**

MDR: - (Memory Data register) MDR is the register of a computer's control unit that contains the **data to be stored in the computer storage** (e.g. RAM), or the **data after a fetch from the computer storage**. It acts **as a buffer** and holds anything that is copied from the memory ready for the processor to use it.

Internal Communication

- **Processor to memory communication**
- **Processor to I/O device communication**

Bus architecture: -

A bus is a set of wire that is used to connect the different internal components of a computer system for transferring data, address, and control.

There may be several buses in a computer system broadly divided into categories.

- **Serial Bus**
- **Parallel Bus**

The speed of any type of bus is measured in terms of the number of bits transferred per second, between two components.

In Serial Bus only one bit of data is transferred at a time, amongst the various hardware components.

In Parallel Bus, several bits of data can be transferred at a time, amongst the various hardware components.

Based on the Type of data it carries

e Control Bus manages the transfer of data and address among various components by transferring appropriate control signals.

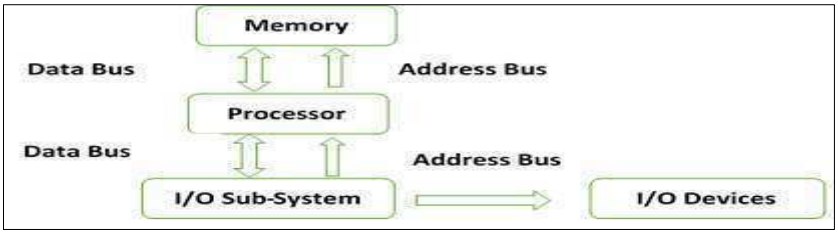


Fig.no 1.12

 # DATA BUS: -

The Databus in a computer system is used to transfer data amongst the different internal components. The speed of the data bus also affects the overall processing power of a computer system. The modern computer system uses 32-bit data buses for data transfer. This means that these buses can transfer 32 bits of data at a time.

The data bus implemented between the main memory and the processor of a computer system.

The above figure shows that a bidirectional data bus is implemented between the main memory and processor of the computer system. The bidirectional data bus allows the transfer of data in both the directions. The data bus is generally bi-directional in nature in the most computer system.

 # ADDRESS BUS: -The address bus is also known as the memory bus. It transfers the memory address for reading and writes memory operations. It contains many address lines that determine the range of memory addresses that can be referenced using the address bus.

For Example-a 32-bit address bus can be used to reference 2 Memory locations. Like data bus, the address bus can also be a serial or a parallel bus.

Instruction Set

The instruction set, also called instruction set architecture (ISA), is part of a computer that pertains to programming, which is basically machine language. The instruction set provides commands to the processor, to tell it what it needs to do. The instruction set consists of addressing modes, instructions, native data types, registers, memory architecture, interrupt, and exception handling, and external I/O.

An example of an instruction set is the RISC, CISC, x86 instruction set, which is common to find on computers today. Different computer processors can use almost the same instruction set while still having very different internal design. Both the Intel Pentium and AMD Athlon processors use nearly the same x86 instruction set.

Examples of instruction set

- ADD - Add two numbers together.
- COMPARE - Compare numbers.
- IN - Input information from a device, e.g. a keyboard.
- JUMP - Jump to designated RAM address.
- JUMP IF - a Conditional statement that jumps to a designated RAM address.
- LOAD - Load information from RAM to the CPU.
- OUT - Output information to device, e.g. monitor.
- STORE - Store information to RAM.

Types

CISC Architecture

The CISC approach attempts to minimize the number of instructions per program, sacrificing the number of cycles per instruction. Computers based on the CISC architecture are designed to decrease the memory cost. Because, the large programs need more storage, thus increasing the memory cost and large memory becomes more expensive. To solve these problems, the number of instructions per program can be reduced by embedding the number of operations in a single instruction, thereby making the instructions more complex.

Characteristics of CISC architecture

- Instruction-decoding logic will be Complex.
- One instruction is required to support multiple addressing modes.
- Less chip space is enough for general purpose registers for the instructions that are 0operated directly on memory.
- Various CISC designs are set up two special registers for the stack pointer, handling interrupts, etc.
- MUL is referred to as a “complex instruction” and requires the programmer for storing functions.

RISC Architecture

RISC (Reduced Instruction Set Computer) is used in portable devices due to its power efficiency. For Example, Apple iPod and Nintendo DS. RISC is a type of microprocessor architecture that uses a highly-optimized set of instructions. RISC does the opposite, reducing the cycles per instruction at the cost of the number of instructions per program Pipelining is one of the unique features of RISC. It is performed by overlapping the execution of several instructions in a pipeline fashion. It has a high-performance advantage over CISC.

RISC architecture characteristics

- Simple Instructions are used in RISC architecture.
- RISC helps and supports few simple data types and synthesize complex data types.
- RISC utilizes simple addressing modes and fixed length instructions for pipelining.
- RISC permits any register to use in any context.
- One Cycle Execution Time
- The amount of work that a computer can perform is reduced by separating “LOAD” and “STORE” instructions.
- RISC contains Large Number of Registers to prevent a various number of interactions with memory.
- In RISC, more RAM is required to store assembly level instructions.

MEMORY AND STORAGE DEVICES: -

The memory unit of a computer is used to store data, instructions for processing data, intermediate results of processing and the final processed information. The memory unit of a computer is classified as primary and secondary memory.

Memory

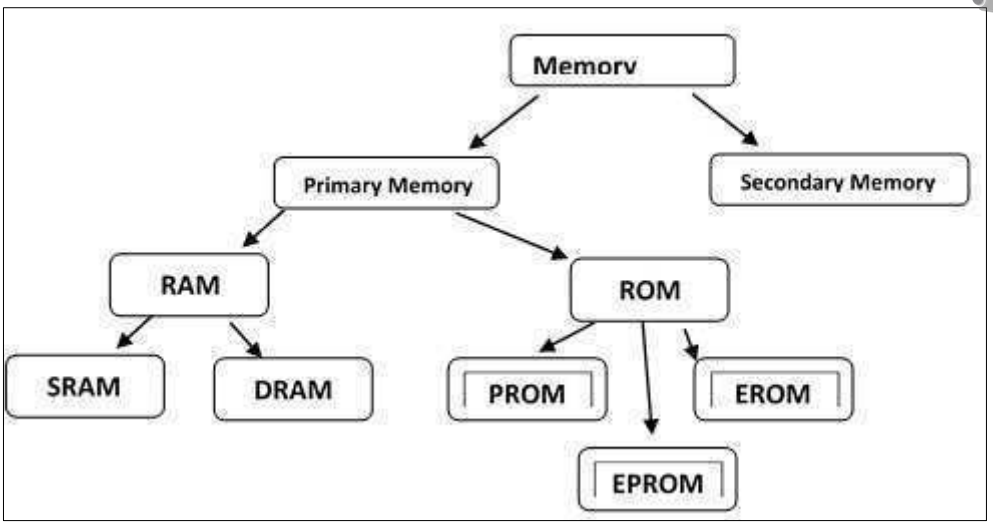


Fig.no 1.13

PRIMARY MEMORY: -

The primary memory is available on the computer as a built-in unit of the computer. The primary memory is represented as a set of location occupying 8 bits. Each bit in the memory is identified by a unique address. The data is stored in the machine understandable binary form in these memory locations.

THE COMMONLY USED PRIMARY MEMORY ARE

Random Access Memory: - This is the primary memory from where data & instructions can be received in a random manner (RAM). It is a volatile memory in which the contents are lost once the power is turned off. The kind of memory is used to store the data temporarily during the computer operations.

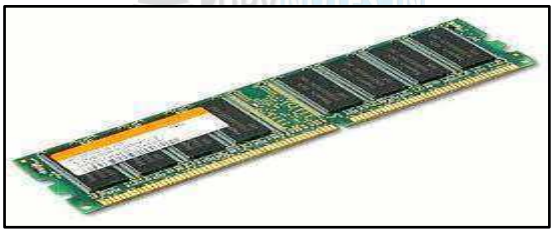


Fig.no 1.14

1. **Static random-access memory (SRAM):** It is a volatile memory based on traditional transistors using flip-flop gates to hold data if the power is on. The contents are lost once the power is turned off. It is very fast and that's why used in the cache memory. The SRAM takes more space and is expensive too, but it is easy to use. It does not need to be refreshed periodically and synchronizes itself with the timing of CPU.
2. **Dynamic random-access memory (DRAM)**: It is a volatile memory based on the capacitors that hold data if the power is on. Due to discharging capacitors, the DRAM is refreshed periodically. This refreshing is done automatically, and due to the time consumed in refreshing. The DRAM is slow. It is inexpensive and takes less space; therefore, DRAM is used as the main memory.

Read Only Memory: ROM is a special type of memory which can only be read and contents of which are not lost even when the computer is switched off. ROM chips are used not only in computers but in most other electronic items such as washing machines, microwave ovens, calculators, laser printers, media players etc. It is not limited to electronic chips, CDROM and DVD ROM. It is categorized as follows:

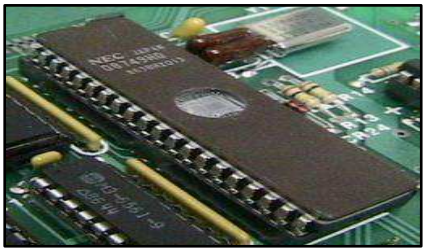


Fig.no 1.15

1. **Programmable read-only memory (PROM):** This is a kind of ROM has not been pre-recorded by the manufacturer but is supplied empty. The user of this ROM can store programs on it using a special tool. Once the empty ROM is programmed, it behaves like any other ROM, that is, it cannot be rewritten.
2. **Erasable programmable read-only memory (EPROM):** This is a ROM which has not been pre-recorded by the manufacturer, but it is supplied empty. The user of this ROM can store programs on it using a special tool. Once the empty ROM is programmed, it can be rewritten repeatedly after erasing the previously written entire contents using the ultraviolet light of specific frequency. EPROM is more expensive than PROM.
3. **Electrically erasable programmable read-only memory (EEPROM):** This is a ROM which has not been pre-recorded by the manufacturer, but it supplied empty. The user of this ROM can store programs on it using a special tool. Once the empty ROM is programmed, it can be rewritten repeatedly after erasing the previously written contents using electric charge. This kind or ROM requires erasing the entire previously written content, but it allows erasing one byte at a time before writing the new content onto it. The EEPROM is more expensive than PROM, but it need not be removed from the computer for rewriting. This is the most flexible type of ROM, which is now commonly used for storing BIOS programs.

SECONDARY MEMORY: -

The secondary memory is the storage devices in which the data can be stored for a longer duration, and it is not lost even when the power is turned off. The hard disks, flash drive, floppy disks, CD-ROMs, and DVDs, etc., are examples of secondary memory. This memory has greater storage capacity than the primary memory. Also, it is inexpensive but slow.

The secondary storage device can be classified as:

Magnetic Storage device: - The magnetic storage devices store information that can be read, erased and rewritten many times. These include a floppy disk, hard disk, and magnetic tapes.

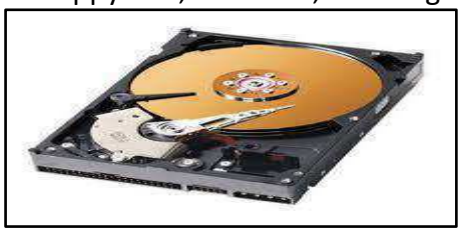


Fig.no 1.16

Optical storage device: - The optical storage devices are secondary storage devices that use laser beams to read the stored data. These include CD-ROM, rewritable compact disk (CD-RW). Digital video disks with read-only memory, etc.

Fig.no 1.17

Magneto-optical storage device: - The magneto-optical devices are generally used to store information, such as large programs, files and backup data. The end user can modify the information stored in magneto-optical devices multiple times. These devices provide higher storage capacity as they use lease beams and magnets for reading and writing data to the device.

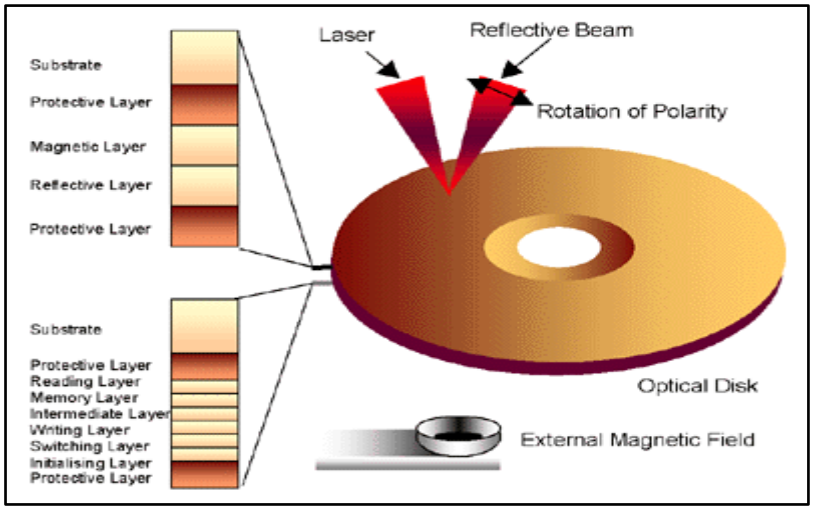


Fig.no 1.18

CACHE MEMORY: -

The cache memory is faster than the CPU registers and slower than the main or primary memory. It is a SRAM placed between the CPU and the main memory, and when CPU needs any data or instruction is found in the cache memory, it is retrieved by the CPU for processing. Otherwise, the main memory is searched for the same information. The most frequently used instructions and data are placed in the cache memory; therefore, the overall speed of the computer is increased.

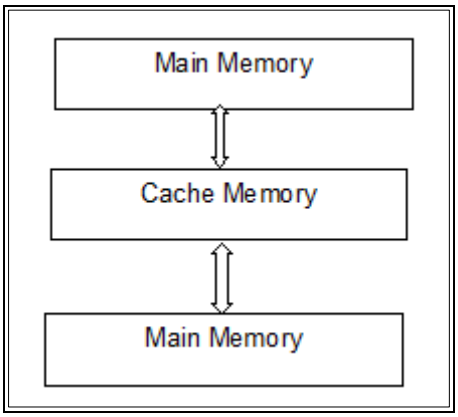


Fig.no 1.19

MEMORY HIERARCHY: -The computer requires different kinds of memory for its proper functioning. Since the fast memories are very expensive, therefore they cannot be used in excess. There is a hierarchy of

memories considering their speed and cost. The registers are the fastest storage devices; even faster than the cache memory (SRAM), which is faster than the main memory.

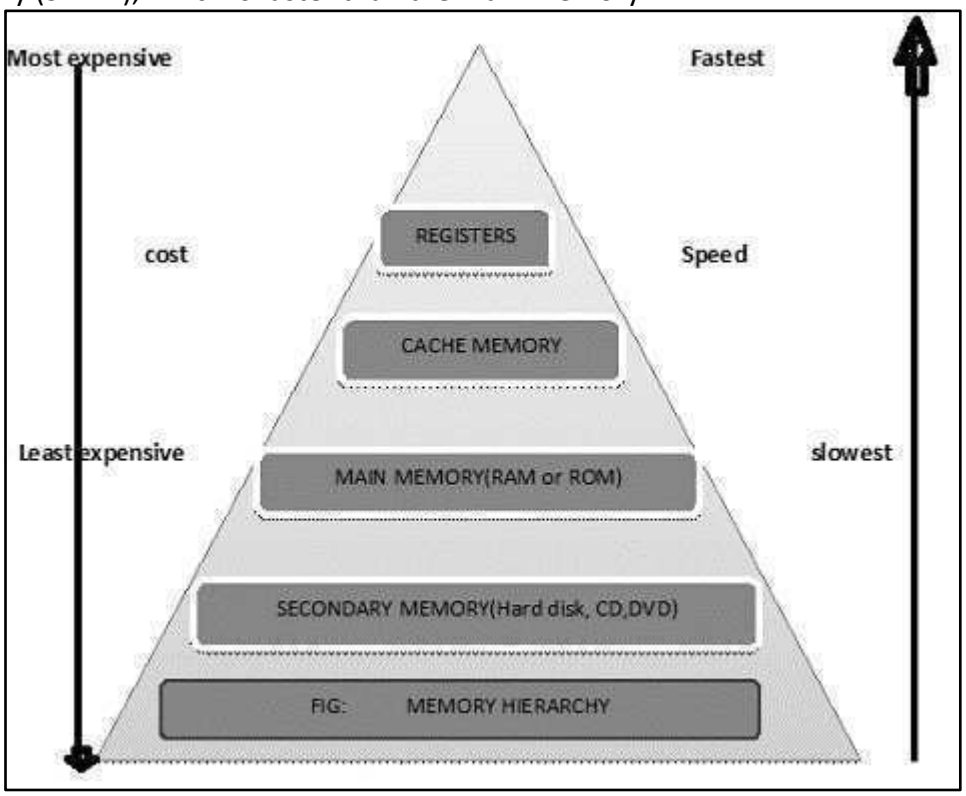


Fig.no 1.20

Fundamental Components of Computer

INPUT UNIT: Input unit is formed by the input devices attached to the computer. Input devices take the raw data from the user to the computer for processing.

- **KEYBOARD: -**
- In computing, a **keyboard** is a typewriter-style device, which uses an arrangement of buttons or keys, to act as mechanical levers or electronic switches. Ref. Fig 1.21

Fig.no 1.21

Fig.no 1.22

Fig.no.1.23

Fig.no.1.24

- **MOUSE: -**
  In computing, a **mouse** is a pointing device that functions by detecting two-dimensional motion relative to its supporting surface. Physically, a mouse consists of an object held under one of the user's hands, with one or more buttons. Ref. Fig 1.22

- **LIGHT PEN: -**
  A **light pen** is a computer input device in the form of a light-sensitive wand used in conjunction with a computer's CRT display. Ref. Fig 1.23

- **TOUCH SCREEN: -**

A **touchscreen** is an electronic visual display that the user can control through simple or multi-touch gestures by touching the screen with one or more fingers. Some touchscreens can also detect objects such as a stylus or ordinary or specially coated gloves. Ref. Fig 1.24

➢ **JOYSTICK: -**

A **joystick** is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling. A joystick, also known as the **control column**, is the principal control device in the cockpit of many civilian and military aircraft, either as a center stick or side-stick. It often has supplementary switches to control various aspects of the aircraft's flight.

Fig.no.1.25

Fig.no.1.26

Fig.no.1.27

Fig.no.1.38

MICROPHONE: -

A microphone is an example of a transducer, a device that changes information from one form to another. Sound information exists as patterns of air pressure; the microphone changes this information into patterns of electric current. The recording engineer is interested in the accuracy of this transformation, a concept he thinks of as fidelity.

➢ **MAGNETIC INK CHARACTER READER: -**

Magnetic ink character recognition, or **MICR**, is a character recognition technology used primarily by the banking industry to facilitate the processing and clearance of cheques and other documents. The MICR encoding, called the MICR line, is located at the bottom of a cheque or other voucher and typically includes the document type indicator, bank code, bank account number, cheque number and the amount, plus some control indicator.

➢ **SCANNER: -**

In computing, an **image scanner**—often abbreviated to just **scanner**—is a device that optically scans images, printed text, handwriting, or an object, and converts it to a digital image.

Optical Mark Reader Fig.no.1.29

Barcode Reader Fig.no1.30

Smart C-R Fig.no.1.31

Web Cam Fig.no.1.32

➢ **OPTICAL MARK READER: -**

Optical mark recognition (also called **optical mark reading** and **OMR**) is the process of capturing human-marked data from document forms such as surveys and tests.

➢ **SMART CARD READER: -**

A **card reader** is a data input device that reads data from a card-shaped storage medium. The first were punched card readers, which read the paper or cardboard punched cards that were used during the first several decades of the computer industry to store information and programs for computer systems.

➢ **BARCODE READER**

A **barcode reader** (or **barcode scanner**) is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones.

➢ **WEBCAM: -**

A **webcam** is a video camera that feeds its image in real time to a computer or computer network.

OUTPUT UNIT: The output generated by the computer is sent to the output device.

Monitor Fig.no.1.33

Printer Fig.no1.34

Speaker Fig.no 1.35

Plotter Fig.1.36

➢ **MONITOR: -**

A **monitor** or a **display** is an electronic visual display for computers. The monitor comprises the display device, circuitry, and an enclosure. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) thin panel, while older monitors use a cathode ray tube (CRT) about as deep as the screen size.

➢ **PRINTER: -**

In computing, a **printer** is a peripheral which produces a representation of an electronic document on physical media such as paper or transparency film. Many printers are local peripherals connected directly to a nearby personal computer. Individual printers are often designed to support both local and network connected users at the same time.

Types of printer:

- Inkjet Printers
- Laser Printers
- Dot Matrix

➢ **SPEAKER: -**

Computer speakers, or **multimedia speakers**, are speakers' external to a computer that disables the lower fidelity built-in speaker.

➢ **PLOTTER: -**

The **plotter** is an output device where a computer printer for printing vector graphics. In the past, plotters were used in applications such as computer-aided design, though they have generally been replaced with wide-format conventional printers.

SOFTWARE: -

The software is defined as a computer program or collection of programs which are designed to solve any task.

TYPES OF SOFTWARE: -

1. System software
2. Application software

SYSTEM SOFTWARE: - System software refers to a computer program that manages and controls hardware component of a computer system. The system software is responsible for handling the function of computer hardware. It is also responsible for the proper function of application software on a computer.

EXAMPLE: -

1. **OPERATING SYSTEM SOFTWARE: -**An operating system is a program which acts as an interface between user and hardware.
2. **LANGUAGE PROCESSOR: -**These are system software which is used to translate the instruction of any programmable language in the form that can be executed by the computer system, Example: - Computer, Interpreter, Assembler.

APPLICATION SOFTWARE: - Application software is a computer program that executes on system software it is designed and develops for performing a specific task for a specific application.

It can be of two types

1. **Special purpose Application Software**
2. **General purpose Application Software**

The application software may be used for painting, making presentations (MS PowerPoint), making documents and reports (MS Word), playing songs or videos(WinAmp), for managing the payroll, for managing the accounts(Tally), for image processing, for compressing the file (WinZip), for searching the location on the globe (Google Earth), for creating architectural design(CAD/CAM), etc. For application software to work smoothly, the system software is also required to be preloaded. The software may be a single program (MS Paint, Notepad) or a collection of programs (MS office) known as a software package. Application program doesn't necessarily come with the computer, rather the user must purchase them or freely download them to use.

Computer Application in e-Business: -

E-Business (e-Business), or Electronic Business, is the administration of conducting business via the internet. This would include the buying and selling of goods and services, along with providing technical or customer support through the Internet. E-Business is a term often used in conjunction with e-commerce but includes services in addition to the sale of goods.

Electronic business commonly referred to as "**E-Business**" or "**E-business**", or an internet business, may be defined as the application of information and communication technologies (ICT) in support of all the activities of the business. Commerce constitutes the exchange of products and services between businesses, groups, and individuals and is one of the essential activities of any business. Electronic

commerce focuses on the use of ICT to enable the external activities and relationships of the business with individuals, groups and other businesses.

Fig.no 1.37

Bio-Informatics: -

Bioinformatics is the field of science which applies computer-based tools and technologies on biological research and development. It primarily involves collection and storage of biological and genetic data on which statistical techniques are applied to arrive at the required solution.

Bioinformatics has become an important part of many areas of biology. In experimental molecular biology, bioinformatics techniques such as image and signal processing allow extraction of useful results from large amounts of raw data. In the field of genetics and genomics, it aids in sequencing and annotating genomes and their observed mutations. It plays a role in the textual mining of biological literature and the development of biological and gene ontologies to organize and query biological data. It plays a role in the analysis of gene and protein expression and regulation.

Health Care: -

Now a day, computers are being used to cater to several different aspects of healthcare. The use of a computer is evident right from the beginning when a patient approaches healthcare facility. The healthcare staffs log the patient's details in an organized manner in a computer system. The same system is used for finding and allocating a vacant bed to the patient if required.

The most significant use of computers within healthcare has been its amalgamation with medical equipment. Most of the medical equipment is now computer-based, thus enabling accurate capture of data in digital form. Further, a device like CT scanner helps the physicians to view a 3-D image of body organs.

Health care (or healthcare) is the diagnosis, treatment, and prevention of disease, illness, injury, and other physical and mental impairments in humans. Health care is delivered by practitioners in medicine, chiropractic, dentistry, nursing, pharmacy, allied health, and other care providers. It refers to the work done in providing primary care, secondary care, and tertiary care, as well as in public health.

Fig.no 1.38

Remote Sensing: -

Remote sensing is the technique of acquiring information about a subject (material or spatial) without coming in direct contact with it. Since there are no direct contact involved, wireless devices are used for performing remote sensing task. Such devices are typically real-time systems that continuously gather and store data related to the subject under observation. A **RADAR** system can be considered as a good example of remote sensing device that measures the time delay between sending and receiving of signals to detect information related to the objects.

Fig.no 1.39

GIS (Geographic information system): -

Geographic information system (GIS) is a system that gathers location-specific data present it is various meaningful forms. It is basically a computer-based information system that captures and stores location-specific data against different parameters.

A geographic information system (GIS) lets us visualize, question, analyse, interpret, and understand data to reveal relationships, patterns, and trends.

Geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present all types of geographical. The acronym **GIS** is sometimes used for **geographical information science** or **geospatial information studies** to refer to the academic discipline or career of working with geographic information systems. In the simplest terms, GIS is the merging of cartography, statistical analysis, and database technology.

Fig.no 1.40

Meteorology and Climatology: -

Metrology is the study of the atmosphere and the related weather condition over short time intervals aims at making routine weather forecasts.

Meteorology is the interdisciplinary scientific study of the atmosphere. Studies in the field stretch back millennia, though significant progress in meteorology did not occur until the 18th century. The 19th century saw breakthroughs occur after observing networks developed across several countries. After the development of the computer in the latter half of the 20th century, breakthroughs in weather forecasting were achieved.

Fig.no 1.41

Computer Gaming: -

Computers are widely used for playing games that are like video or console- based games. A computer must process graphics and animations support for ensuring rich gaming experience to the user. The computer gaming industry has evolved tremendously over the experience over the past decade.

Computer and video games are a maturing medium and industry and have caught the attention of scholars across a variety of disciplines. By and large, computer and video games have been ignored by educators.

Fig.no 1.42

Multimedia: -

Multimedia is media and content that uses a combination of different content forms. This contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material. Multimedia includes a combination of text, audio, still images, animation, video, or interactivity content forms.

Multimedia is usually recorded and played, displayed, or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Multimedia devices are electronic media devices used to store and experience multimedia content.

Fig.no 1.43

Animation:-

The animation is the rapid display of a sequence of images to create an illusion of movement. The most common method of presenting animation is as a motion picture or video program, although there are other methods. This type of presentation is usually accomplished with a camera and a projector or a computer viewing screen which can rapidly cycle through images in a sequence. Animation can be made with either hand rendered art, computer-generated imagery, or three-dimensional objects, e.g. puppets or clay figures, or a combination of techniques. The position of each object in any image relates to the

position of that object in the previous and following images so that the objects each appear to fluidly move independently of one another. The viewing device displays these images in rapid succession, usually 24, 25, or 30 frames per second.

Fig.no 1.44

Operating System: -

Operating System is software that works as an interface between a user and the computer hardware. The primary objective of an operating system is to make computer system convenient to use and to utilize computer hardware in an efficient manner. The operating system performs the basic tasks such as receiving input from the keyboard, processing instructions and sending output to the screen.

Various types of operating systems are UNIX/LINUX/REDHAT/UBUNTU, MS-DOS, MS-Windows - 98/XP/Vista/windows7/windows8/windows10, Windows-NT/2000/2003/2005, OS/2 and Mac OS.

The operating system manages overall activities of a computer and the input/output devices attached to the computer. It is the first software you see when you turn on the computer, and the last software you see when the computer is turned off. It is the software that enables all the programs you use. At the simplest level, an operating system does two things:

The first, it manages the hardware and software resources of the computer system. These resources include the processor, memory, disk space, etc.

The second, it provides a stable, consistent way for applications to deal with the hardware without having to know all the details of the hardware.

Functions of Operating System: -

The various Functions those are Performed by the Operating System are as Explained below: -

Operating System as a Resource Manager: -

Operating system also known as the resource manager means operating system will manage all the resources those are attached to the system means all the resources like memory and processor and all the input-output devices those are attached to the system are known as the resources of the computer system and the operating system will manage all the resources of the system.

Storage Management: -

The operating system also controls the all the storage operations means how the data or files will be stored on the computers and how the files will be accessed by the users etc. All the operations those are responsible for storing and accessing the files is determined by the operating system.

Process management: the operating system also treats the process management means all the processes those are given by the user or the process those are system ‘s own process is handled by the operating system. The operating system will create the priorities for the user and start or stops the execution of the process and makes the child process after dividing the large processes into the small processes.

Memory management: - the operating system also manages the memory of the computer system means to provide the memory to the process and deallocate the memory from the process. And defines that if a process gets completed then this will deallocate the memory from the processes.

Extended machine: - The operating system also behaves like an extended machine means operating system also provides us sharing of files between multiple users, also provides some graphical environments and provides various languages for communications and provides many complex operations likes using many hardware and software.

Mastermind: - The operating system also performs many functions and for those reasons, we can say that operating system is a mastermind. It provides booting without an operating system and provides facility to increase the logical memory of the computer system by using the physical memory of the computer system and provides various types of formats like NTFS and fat file systems.

Types of Operating System

There are Many Operating Systems those have been developed for performing the operations those are requested by the user. There are many Operating Systems which have the capability to perform the requests those are received from the System. The Operating system can perform a single operation and multiple operations at a time. So, there are many types of Operating systems those are organized by using their Working Techniques.

1) Serial Processing: - The Serial Processing Operating Systems are those which perform all the instructions in a sequential manner or the Instructions those are given by the user will be executed by using the FIFO manner means First in First Out. All the Instructions those are entered first in the system will be executed first and the Instructions those are entered later will be executed later. For running the instructions, the program counter is used which is used for executing all the Instructions.

2) Batch Processing: - The Batch Processing is same as the Serial Processing Technique, but in the Batch Processing similar types of jobs are firstly prepared and they are stored on the Card, and that card will be submitted to the system for the processing. The System then Perform all the operations on the Instructions one by one, and a user can't be able to specify any input. Operating System will increment his Program Counter for executing the next Instruction.

The main problem is that the Jobs those are prepared for execution must be the same type and if a job requires for any type of input then this will not be possible for the user. Many times, a lot of time will be wasted for preparing the batch.

The speed of the processing the Job will depend on the Jobs and the results those are produced by the system in the difference of time which is used for giving or submit the Job and the time which is used for displaying the results on the screen.

3) Multi-Programming: - As we know that in the batch processing system there are multiple jobs execute by the System. The system first prepares a batch and after that, he will execute all the jobs those are stored into the batch. But the main problem is that if a processor job requires an Input and Output operation, then it is not possible and second there will be the wastage of the Time when we are preparing the batch and the CPU will remain idle at that time.

4) Real-Time System: - There is also an Operating System which is known as Real Time processing system. In this response time is already fixed. Means time to display the results after possessing has fixed by the processor or CPU. A real-time system is used at those places in which we require higher and timely response. These types of systems are used in the reservation. So, when we specify the request, the CPU will perform at that time. There are two types of Real-time system

I. Hard Real-Time System: - In the Hard-real-time system, time is fixed and we can't change any moments of the time of processing. Means CPU will process the data as we enter the Data.

II. Soft Real-Time System: - In the Soft Real-Time System, some moments can be changed, means after giving the command to the CPU. CPU performs the operation after a Microsecond.

5) Distributed Operating System: - Distributed Means data is stored and processed on multiple locations. When a data is stored in the multiple computers, those are placed in different locations. Distributed means in the Network, with collections of computers connected with each other.

Then if we want to take some data from another computer, then we use the distributed Processing System. We can also Insert and Remove the data from our location to another location. In this data is shared between many users, and we can also access all the Input and Output Devices are also accessed by Multiple Users.

6) Multiprocessing: -Generally, a computer has a Single Processor means a computer have a just one CPU for processing the instructions. But if we are running multiple jobs, then this will decrease the speed of CPU. For increasing the speed of processing then we use the Multiprocessing. In the Multi-Processing there are two or more CPU in a single operating system if one CPU will fail, then another CPU is used for providing backup to the first CPU. With the help of multiprocessing, we can execute many jobs at a time. All the operations are divided into the Number of CPU's, if the first CPU completed his work before the second CPU, then the work of the second CPU will be divided into the first and second.

7) Parallel operating systems: - are used to interface multiple networked computers to complete tasks in parallel. The architecture of the software is often a UNIX-based platform, which allows it to coordinate distributed loads between multiple computers in a network. Parallel operating systems are able to use software to manage all of the different resources of the computers running in parallels, such as memory, caches, storage space, and processing power. Parallel operating systems also allow a user to directly interface with all the computers in the network.

File System: -

A file can be "free formed", indexed or a structured collection of related bytes having to mean only to the one who created it. Or in other words, an entry in a directory is the file. The file may have attributes like name, creator, date, type, permissions etc.

File Structure

A file has various kinds of structure. Some of them can be:

- **Simple Record Structure** with lines of fixed or variable lengths.
- **Complex Structures** like a formatted document or reloadable load files.
- **No Definite Structure** like a sequence of words and bytes etc.
- **Attributes of a File**
- Following are some of the attributes of a file:
- **Name.** It is the only information which is in human-readable form.
- **Identifier.** The file is identified by a unique tag(number) within the file system.
- **Type.** It is needed for systems that support different types of files.
- **Location.** Pointer to file location on device.
- **Size.** The current size of the file.
- **Protection.** This controls and assigns the power of reading, writing, executing.
- **Time, date, and user identification**. This is the data for protection, security, and usage monitoring.

File Access Methods: -

The way that files are accessed and read into memory is determined by Access methods. Usually, a single access method is supported by systems while there are OS's that support multiple access methods.

Sequential Access: -

- Data is accessed one record right after another is an order.
- Read command cause a pointer to be moved ahead by one.
- Write command allocate space for the record and move the pointer to the new End of File.
- Such a method is reasonable for tape.

Direct Access: -

- This method is useful for disks.
- The file is viewed as a numbered sequence of blocks or records.
- There are no restrictions on which blocks are read/written; it can be done in any order.
- The user now says, "read n" rather than "read next".
- "n" is a number relative to the beginning of the file, not relative to an absolute physical disk location.

Indexed Sequential Access: -

- It is built on top of Sequential access.
- It uses an Index to control the pointer while accessing files.

What is a Directory: -

Information about files is maintained by Directories. A directory can contain multiple files. It can even have directories inside of them. In Windows, we also call these directories as folders.

Following is the information maintained in a directory:

- Name The name visible to the user.
- Type: Type of the directory.
- Location: Device and location on the device where the file header is located.
- Size: Number of bytes/words/blocks in the file.
- Position: Current next-read/next-write pointers.
- Protection: Access control on read/write/execute/delete.
- Usage: Time of creation, access, modification etc.
- Mounting: When the root of one file system is "grafted" into the existing tree of another file system it's called Mounting.

File Systems: -

Provide a means to store data organized as files as well as a collection of functions that can be performed on files.

Maintain a set of attributes associated with the file.

Typical operations include:

- **Create**
- **Delete**
- **Open**

- **Close**
- **Read**
- **Write**

File Management System Objectives: -

- Meet the data management needs of the user
- Guarantee that the data in the file are valid
- Optimize performance
- Provide I/O support for a variety of storage device types
- Minimize the potential for lost or destroyed data
- Provide a standardized set of I/O interface routines to user processes
- Provide I/O support for multiple users in the case of multiple user systems

Minimal User Requirements: -

- Should be able to create, delete, read, write and modify files
- May have controlled access to other users' files
- May control what type of accesses on the files
- Should be able to restructure the files in a form appropriate to the problem
- Should be able to move data between files
- Should be able to back up and recover files in case of damage
- Should be able to access his or her files by name rather than by numeric identifier

Device Drivers: -

- Lowest level
- Communicates directly with peripheral devices
- Responsible for starting I/O operations on a device
- Processes the completion of an I/O request
- Considered to be part of the operating system

Introduction to MS word, MS power point, MS Excel: -

Word processing: -

Word processing software is used to create and maintain electronic documents. Alterations can easily be made to stored documents (instead of retyping them), and multiple copies can be printed. Professional looking results can be obtained by using different fonts, and by incorporating graphics into a document.

The MS Word 2007 window: -

- The old menu system has been replaced by the Ribbon and the Office button. The Office button contains a menu of file-related commands.
- The Quick Access toolbar provides a set of frequently used commands. The default options are to save a file, to undo the last action, and to repeat your most recent action.
- The Ribbon tabs provide you with a set of tools that are relevant to what you are currently doing.
- The Title bar displays the name of the program and the name of the current document. If you haven't named the document yet, then it will be called something like document.
- Window controls are used to change the size of a window or to close it.
- The Vertical scrollbar is used to scroll up and down the page. If your page is wider than the screen display, then you will also see a Horizontal scrollbar across the bottom of the window.

- The Status and information bar displays useful information about your documents, such as the page count and many words.

Options for viewing a document in Word

Word offers five different views

- Print Layout
- Full-screen reading
- Web layout
- Outline view
- Draft view

Non-printing characters are characters that are used to format your document, but that isn't displayed as text on your screen. These symbols can be very useful when you are looking for formatting errors in your document.

Save or Save As Option: -

If you want to keep the same file name and location, then the Save icon and the Save menu option will both save the file with no further comment. If you'd like to save an existing document under a new name, or in a different location, then you need to use the Save As command.

Closing Word: -

- There are several methods you can use to end Word:
- Click the Office button, and then click the Exit Word button in the bottom right corner.
- Alternatively, close the window by clicking on the X at the far-right edge of the title bar.

Excel spreadsheets: -

A spreadsheet is the computer equivalent of a paper ledger sheet. It consists of a grid made of columns and rows. It is an environment that can make number manipulation easy. If you change the month/day amount, you will have to start the math all over again. On the computer version, you can change the values and the result is automatically recalculated. Basics of a Spreadsheet are made up of columns

rows:-and their intersections are called cells. In each cell, there may be the following types of data

–text (labels)
– number data (constants)
– formulas (mathematical equations that do all the work).

Microsoft Excel is an electronic spreadsheet application. ˆA spreadsheet is the computer equivalent of a paper ledger sheet. Microsoft Excel can be used to organize, calculate, and analyze the data.

- format your data.
- organize your data by sorting it.
- name ranges of data and use the range names in formulas and navigation for automatic updating.
- use cell references rather than values in formulas allowing you to adjust formulas as you copy and move them across the spreadsheet.
- generate charts and graphs illustrating your data.
- automate and customize procedures by using macros.
- How will you Perform Mathematical Calculations in excel?

In Microsoft Excel, we can enter numbers and mathematical formulas into cells. Whether we enter a number or a formula, can reference the cell when we perform mathematical calculations such as addition, subtraction, multiplication, or division. When entering a mathematical formula, precede the formula with an equal sign. Use the following to indicate the type of calculation wishes to perform:

- +Addition
- -Subtraction
- *Multiplication
- /Division
- ^ Exponential

Auto fills feature in Excel A very handy feature in Excel is AutoFill, which allows y us to automatically fill cells with pre-set data. If we need to add the months of the year or the days of the week to our spreadsheets, we can do so using AutoFill.

It is also possible to customize the lists of data that work with Auto Fill so that easily add data that is used frequently. If regularly adds the same department names or part numbers to spreadsheets one can add these names to the AutoFill feature making it easier to enter them when needed.

Workbook: -

A workbook is a spreadsheet file. By default, each workbook in Excel contains three pages or worksheets. The term spreadsheet is often used to refer to a workbook, when in actual fact; spreadsheet refers to the computer program, such as Excel. So, when we open the Excel spreadsheet program it loads an empty workbook file consisting of three blank worksheets for you to use.

Features of Excel: -

- Hyperlink: -We can link one file to another file or page with the use of Excel.
- Clipart: - In this, we can add images and audio, video clips can be added here.
- Charts: - With charts, we can clearly show products evaluation to the clients.
- Tables: - Tables are created with different fields eg -name, age, address, roll no so we add a table to fill these values.
- Functions: - MATHEMATICAL: Add, subtract, div, multiply. LOGICAL: average, sum, mod, product.
- Images and Backgrounds: - In this, we add images and backgrounds to the sheet.

Macros: - Macros are used for recording events for further use.

Database: - We can add database from other sources with data feature.

Sorting and Filter: - In sorting, we can sort our data and filter our data so that repetitions will be removed.

Data Validations: - In data tools, there are data validations consolidate etc are used.

Grouping: - In this, we can use group, ungroup subtotal etc.

Page layout: - In this theme, colors, sheets, margins, size, backgrounds, breaks, print, titles, sheets height, width, scaling, goodness, headings, views, bring to the front of font or back alignment etc will be used.

Excel Headers and Footers: -

In Microsoft Excel, headers and footers are lines of text that print at the top (header) and bottom (footer) of each page in the spreadsheet. They contain descriptive text such as titles, dates, and/or page numbers. They are used to add information to a spreadsheet that is being printed. Excel has several pre-set headers and footers that you can use. These standard options include the sheet name, date, time, page number,

and file name. There is also an option for creating your own custom headers or footers that can include text, graphics, or other spreadsheet data.

The difference between a worksheet and a workbook in Excel: -

A worksheet is a single spreadsheet page and a workbook is a collection of all the worksheets in a single file. A workbook contains worksheets, in the same way, that a book contains pages. A workbook consists of one or more worksheets.

For example, if you had one sheet that was a table with information and another sheet with a pie chart, you would have a workbook. On the other hand, a worksheet is one spreadsheet in Excel that you are working on.

PowerPoint – for presentations: -

Microsoft PowerPoint is a presentation program currently developed by Microsoft, for use on both Microsoft Windows and Apple Macintosh operating systems. PowerPoint, initially named "Presenter", was created by Forethought Inc. Microsoft's version of PowerPoint was officially launched on May 22, 1990, as a part of the Microsoft Office suite. PowerPoint is useful for helping develop the slide-based presentation format and is currently one of the most commonly used slide-based presentation programs available. Microsoft has also released the PowerPoint mobile application for use on Apple and Android mobile operating systems. The following activities will be carried out with the help of powerpoint presentation: -

Create a new presentation: -

using the wizard, design-template, or blank presentation

Using blank-presentation is the most flexible for you

Understand the tools inside of power point

Moving from slide to slide – Presenting your slide Creating a new presentation

"AutoContent Wizard" walks you through a series of questions about your presentation, letting you choose from a variety of predetermined content themes, visual styles, and formatting options. You can answer all the questions or skip some and click "Finish" at any time.

"Design Template" allows you to choose from various background designs and slide styles to use throughout your presentation. Clicking the various presentation options shows thumbnail views of their designs. Click "OK" to choose one.

"Blank Presentation" starts you out with blank slides

VIEWS – PowerPoint has several 'views' that allows you to edit and see presentation content in various useful ways. You can switch among the views as you work by selecting one from the View menu or clicking one of the five 'view' buttons in the lower left-hand corner of the PowerPoint window. - In the Normal view, the screen is split into three sections showing the presentation outline on the left, the slide in the main window, and notes at the bottom.

RGPVNOTES.IN

We hope you find these notes useful.

You can get previous year question papers at https://qp.rgpvnotes.in .

If you have any queries or you want to submit your study notes please write us at rgpvnotes.in@gmail.com

LIKE & FOLLOW US ON FACEBOOK
facebook.com/rgpvnotes.in