COMPUTER SHIKHON O SHIKSHON

(Computer Applications in Education)

School Education Department,

Government of West Bengal

State Council of Educational Research and Training

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Preface

The subject "Computer Shikhon O Shikshon" (*Computer Applications in Education*) has been organized as per NCTE's newly developed syllabus, 2014. The course of this subject is scheduled for completion of two years and is included in the curriculum of 'Diploma in Elementary Education (D.El.Ed.). The main objective of this curriculum is to transform the environment and methods of education as per the National Curriculum Framework for Teacher Education (NCFTE 2009). This transformation is absolutely necessary to keep up with today's rapidly changing society, environment and lifestyle. The revision of the syllabus and the annexation of the paper have mainly been made with this change in mind. It should be noted that the content of the book is by no means limited to written subjects. Only outlines and guidelines are provided in this.

The main objectives of writing this book are-

a) To take a holistic view of various educational subjects.

b) To acquire knowledge about basic concepts in human nature, society, learning and goals of education.

c) To acquire knowledge about various components of education.

d) To form concepts between learning and teaching by the teachers.

e) To gain knowledge about different approaches to curriculum and child knowledge construction.

f) To acquire knowledge about school leadership, management, effectiveness and its quality.

This textbook is a joint research work of State Council of Educational Research and Training (SCERT, WB) and District Institute of Education and Training (DIET). Due to lack of suitable textbooks for the new D.El.Ed course in Teacher-Education Institutions, this body vide Government Instruction 712-Edn (CS)/8T-17/79, dated 21.05.1980 Sections (iii), (iv), (viii) and (x)) undertook and project called "Development of Teaching Clarity". The words that emerged emphatically from the teachers-trainers present at each of these project workshops were "D.El.Ed needs the right teaching and learning materials".

This book is the result of tireless efforts of every staff member of State Council of Education Research and Training (SCERT), and various District Education and Training Institutes (DIETS). The content of this book was developed through a number of processes. All efforts will be worthwhile if it is welcomed in the teacher-education programme. Our next generation will be properly educated if this process is transformed through the application of "Computer Shikhon O Shikshon" (*Computer Applications in Education*) in the field of education. The content prepared through initial application and research is then subjected to final editing. It is through these stages that this book emerged today.

The contributions from Dr. Chhanda Ray, Director, SCERT (WB) in writing the original Bengali version of this book is commendable.

Under requests from various TEIs with medium of instruction other than Bengali, SCERT, WB, subsequently embarked on a project to get this body work, amounting to 10 titles in all, to get translated in English, Urdu and Santhali. The translation work was taken up in teams under the supervision of

the Director, SCERT (WB), and under coordination of Shri Subrata Kumar Biswas, Research Fellow, Grade-II, SCERT (WB). The team for transcreating the present book constituted of Sri Sombhu Some, Assistant Technician, Computer, DIET Jalpaiguri.

Since this work of translation work can best get critiqued while in use by the practicing teacher educators and the D.El.Ed trainees, any constructive criticism by way of suggestion to improve the present book is heartily solicited.

The effort gone into this transition will get its due recognition if this book meets the requirements of its readers.

Dr. Chhanda Ray
Director, SCERT (WB)

CC – 05: Computer Application In Education

Maximum Marks=100

Internal=30 External=70

Pass Marks=40% of Full Marks in each of the External & Internal Evaluation

Student Contact = 90 hours

Objectives:

- To prepare the student-teachers for the emerging ICT – dependent-class-room transactions
- To acquaint them with the basic operations in computer system
- To help them understand Computer Aided Learning (CAL) and prepare CAL materials and plan such lessons
- To help them use computer for learning enhancement programme.

Unit-1 : Basic Concept in Computer	**Class : 9 hours**
1.1: Introduction	1 hour
1.2: Objectives of the unit	1 hour
1.3: Some common Functions/Operations of Computer	2 hours
1.4: Various Features of the Computer System	3 hours
1.5: Computer Configuration	2 hours
Unit-2: Computer Operating System	**Class: 10 hours**
2.1: Introduction	1 hour\
2.2: Objectives of the Unit	1 hour
2.3: Computer Memory	2 hour
2.4: Operating System	3 hour
2.5: Computer Network	3 hour
Unit – 3: Word Processing System in Computer	**Class : 11 Hours**
3.1: Introduction	1 hour
3.2: Objectives of the Unit	1 hour
3.3: Some General Characteristics of Word Processing System in Computer	4 hours
3.4: Mail Merge	3 hours
3.5: Printing Documents	2 hours
Unit-4 : MS Excel	**Class: 11 hours**
4.1: Introduction	1 hour
4.2: Objectives of the Unit	1 hour
4.3 Work Sheet	2 hours

4.4:	Uses of Charts and Graphs in Excel Sheet	4 hours
4.5:	Use of Formula in Excel (very Simple Form)	3 hours
Unit-5 : Using Power Point in Teaching Learning Process		**Class : 12 hours**
5.1:	Introduction	1 hour
5.2:	Objectives of the Unit	1 hour
5.3:	Basic Concepts of Power Point	2 hours
5.4:	Preparations through Power Point	5 hours
5.5:	Slide Show and Slide Printing	1 hour
5.6:	Planning Lessons by Using Power Point	1 hour
Unit–6: Computer Aided Learning		**Class : 17 hours**
6.1:	Introduction	
6.2:	Objectives of the Unit	1 hour
6.3:	Computer Aided Learning-Concept Formation & Method Application	2 hours
6.4:	Preparation of Learning-Teaching Materials by using Computer	2 hours
6.5:	Application of the Learning-Teaching Materials	3 hours
6.6:	Application of CAL Materials in the Instructional System	4 hours
6.7:	Project Activities on Preparation of CAL Materials	5 hours
Unit-7 : Web Based Learning		**Class : 17 hours**
7.1:	Introduction	1 hour
7.2:	Objectives of the Unit	1 hour
7.3:	World Wide Web (www)	1 hour
7.3.1:	Conceptual Frame Work of WWW	1 hour
7.4:	Fundamentals of Internet	2hour
7.4.1:	Concept of Some Fundamentals used in Internet	2 hour
7.5:	Uses of Internet	3 hour
7.5.1:	Downloading Information from Internet & using the same for the development of Children	3 hour
7.5.2:	Uses of Web in Teaching-Learning System	1 hour
7.5.3:	Importance of Email in Communication and Teaching-Learning System	1 hour
7.5.4:	Creating Password for Net Work Security	1 hour
Unit–8 : Virus Protection in Computer		**Class : 3 hours**
8.1:	Concept of Virus in Computer	1 hour
8.2:	Fire Wall Protection in Computer	1 hour
8.3:	Uses of Anti Virus for Security	1 hour

Transaction Modalities :

1. Lecture and demonstration with hands on experiment 20 hour

2. Practical 70 hour

Evaluation:

1 Formative Evaluation : 30 Marks

2. Sessional Work :

a) Preparation of CAL Materials on Bengali,
b) English,
c) Maths, Science
d) Social Science, and
e) EVS

$5 \times 10 = 50$

3. Preparation of Marksheet in Excel Sheet 10

4. Drawing Statistical Figures using data in Excel Sheet 10

CONTENT

UNIT

1

Basic Concepts of Computer

1.1 Introduction

The word computer comes from the latin word "Compute." - which means to calculate. A computer can not be understand properly just as a Computing device. A computer may be defined as a complex electronic system which can produce output step by step depending on the input data through logical and mathematical operations. It is a high speed device and also produces output by processing of input using various peripheral devices attached with the system. The main function of a computer system is to collect data or input, process the input and output the result and store the output if and when necessary.

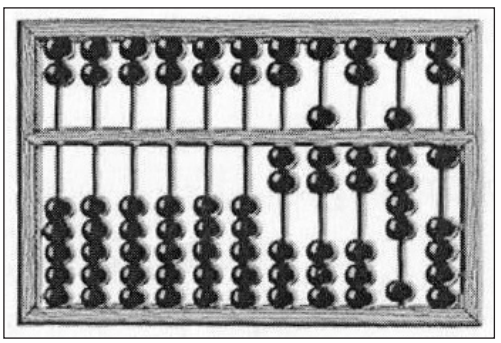


Fig.1.1 Abacus

Input → Process → Out put → Store (if necessary)

Computer is the best invention of 20th century. But it could not be done in an over night. About 4000 years ago China first invented and used 'Abacus' as a calculating device. In the year 1617 Jhon Napier invented another calculating device Napier's Bone. Another remarkable invention was William Oughtred's "Slide Rule". In the year 1642 the French Mathematician Blaise Pascal invented an advanced calculating device known as Pascaline machine- which could performe addition and

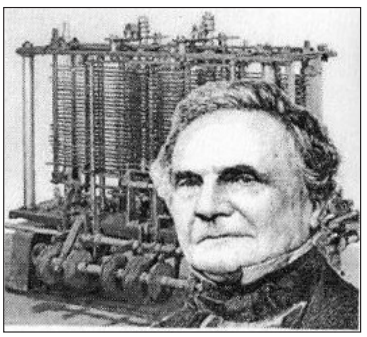


Fig -1.2 Charles Babbage

Subtraction automatically. Later in 1823 Charles Babbage developed Difference Engine- which could perform mathematical as well as statistical calculations. In 1837 he developed more powerfull device from Difference Engine known as Analytical Engine. Analytical Engine was the first ancestor of modern Computer. So Charles Babbage is known as the father of modern computer.

1.2 Objectives of the Unit

After reading of this unit learners will be able to -

- Understand the architecture of a of computer system and the functions of its various parts.
- Know the history of evolution of Computer and its various generations.
- Understand the features and configuration of a computer system.
- Describe the general functions and classifications of Computer System.

1.3 History of Evolution of Computer

At the end of 19th century, Dr. Herman Hollerith and James Powers developed 'Census Machine' for processing of census data in America. This machine was able to analyse both type of data alphabetical as well as numerical. In 1896 Hollerith established a company named "Tabulating" for manufacturing of census machine. Later some of these types of companies were marged to form the famous company named IBM (International Business Machine). At the earlier of 1990 the electromagnetic MARK-I was developed. Later in the same year first electric computer ENIAC (Electronic Numerical Integrator and calculator) was developed

Depending on the characteristics and the period of development the computers which were developed after the invention of ENIAC were classified into five various generations, such as First generation, Second generation, Third generation, Fourth generation and Fifth generation. The characteristics of each generation of computers are described as below —

First generation (1942-1959):

Some remarkable Computers of this generation are ENIAC, EDVAC, UNIAC-I, IBM 650, IBM 701 etc. The main characteristics of these generation are–

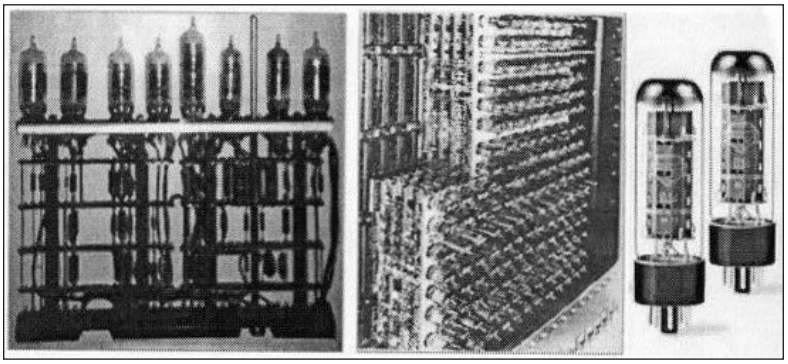


Fig.1.3 First Generation Computer

- The main component was vaccum Tube.
- These machines were of large size.
- Magnetic drum and magnetic tape were used as primary and secondary memory respectively.
- Earlier machine language was used in this generation Computers but later on Assembly language was used in these computers.

Second Generation (1959-1965):

Some remarkable computers of this generation are – IBM 1400, 1BM 700, HONEY WELL 200 etc. The great scientists like Bardeen, Brattain and Shockley first unitedly invented Transistor in the Bell Laboratory. The second generation of Computers was started with the use of this transistor insted of vaccum tubes. The general characteristics of this generation computer are —

- Transistors were used as main component.
- Size of these computers were smaller than that of first generation computers.
- Magnetic core was used as memory.
- Various High Level Languages like COBOL, BASIC PL/1 were started to use in this generation

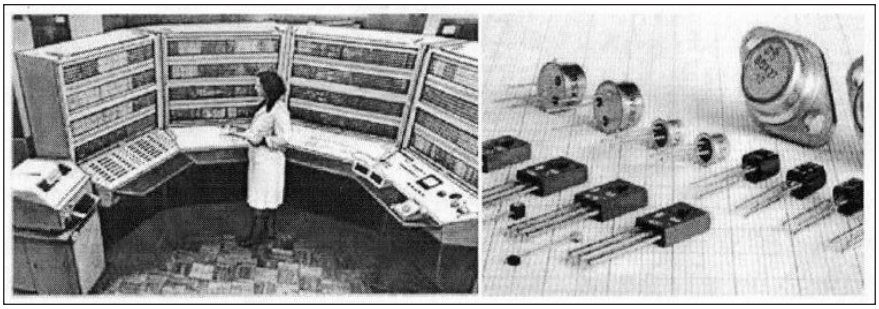


Fig.1.4 Second Generation Computer

Third Generation (1965-1971)

Some important computers of this generations were IBM 360, 370, NCR 395 etc. This generation was started after the invention of IC or Integrated Circuity. The general characteristics of third generation computers are —

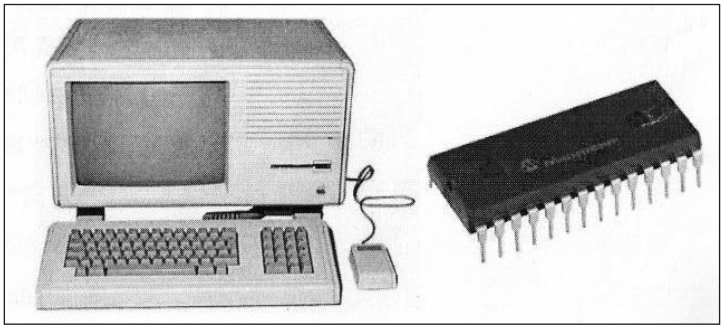


Fig.1.5 Third Generation Computer

- IC or Integrated Circuit was used as main component.
- The size of the computers were comparatively smaller than that of earlier generations.
- Use of keyboard and Monitor was started as input and output device respectively.
- Magnetic disk was used as secondary memory. High Level Languages like PASCAL, FORTRAN etc. was started to use from this generations.

Fourth Generation (1971-1998)

The Computers of this generation were-3086, 30286, 30486, Pentium etc. The fourth generation of computer was started with the use of LSI (Large Scale Integration) and VLSI (Very Large scale Integration) circuit. The general characteristics of fourth generation Computers are –

- LSI and VLSI circuits were used as main Component
- use of Mouse, Printer and speaker was started from this generation
- The size of computers of this generation was quite smaller than that of other earlier generations.
- Use of high capacity storage magnetic disk, CD-ROM etc. was started in this generation.
- The high level languages like C, C++, visual Basic etc. and various Packages like word processing, Spread Sheet, Database were started to use successfully from this generation.

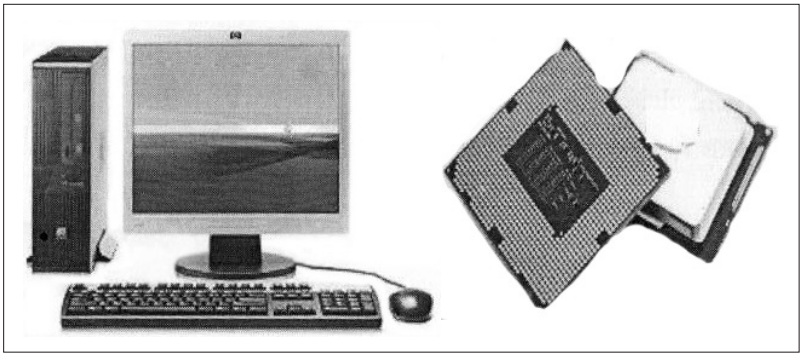


Fig.1.6 Fourth Generation Computer

Fifth Generation (1998 and onwards)

In this generation research on more powerful and Artificial Intelligence supported Computers is going on. The general characteristics of this generation computers are –

- ULSI (Ultra Large Scale Integration) circuit is used as main component.
- Use of LCD and LED monitors are started.
- The size of computers in this generation become quite smaller and portable.
- The Intelligence programming based on Artificial Intelligence has developed started to use generation computers.
- High storage capacity Hard Disk is used in these computers.

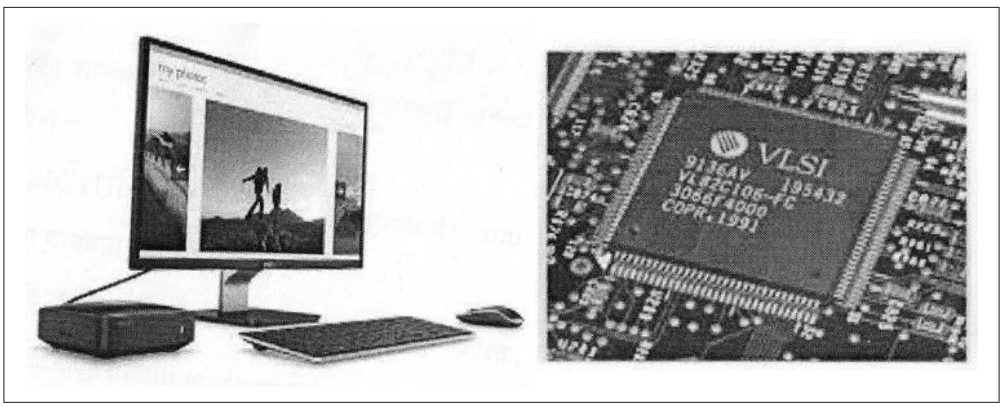


Fig.1.7 Fifth Generation Computer

1.4 Some common Functions/Operations of Computer

A Computer system is made up of various devices which are collectively known as hardware. Some of such devices are Processor, Mother Board, Monitor, Disk drive, Key Board, Mouse etc. The instructions specific to a computer and the data or informations which can not be visible or touched are known as Software. A Software is basically a computer programme which is written as a set of data as

well as instructions for a computer system. Thus it can be said that a computer system is an electronic device which consists of Hardware and Software.

Generally the functions of a computer can be classified into four categories. Such as —

- Input
- Processing
- Storage
- Output

Input :

The raw facts and figures depending on which a Computer generates information is known as Data. e.g. to calculate the average of two or more numbers it is required to input the numbers into the computer. These numbers are known as data. The output generated by processing of data is known as information. In the earlier example the average is known as information and the numbers are known as data. The information obtained from one processing may act as data for another processing.

The data or information which are required to enter into the computer for a particular processing is known as input. The input are entered into a computer using Keyboard, Mouse etc. These devices are known as input device.

Processing:

The manner by which data or informations generated by processing of data are stored arranged as per requirement temporarily or permanently into a computer system to use it in future is known as storage.

Output:

The result obtained after processing of data is known as output. Such output displayed to the outer world through the monitor or may be printed by the printer.

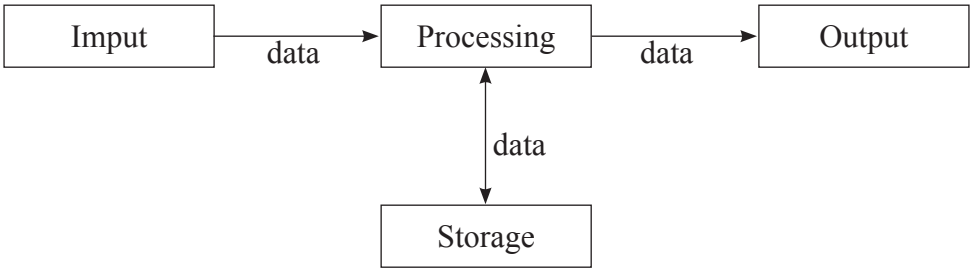


Fig-1.8 Function of a Computer System

The function of a Computer System has been shown in the fig-1.8. To describe the function more elaborately an example may be considered. Let us take ten numbers and find the largest and the smallest of them. To perform this task, first ten numbers must be given as input to the computer system. By processing the data from these inputs, the computer will identify the largest and smallest numbers as the output. This output can be stored temporarily or permanently in the computer for later use or the output can be displayed to the outside would through monitor.

• **Classification of Computers**

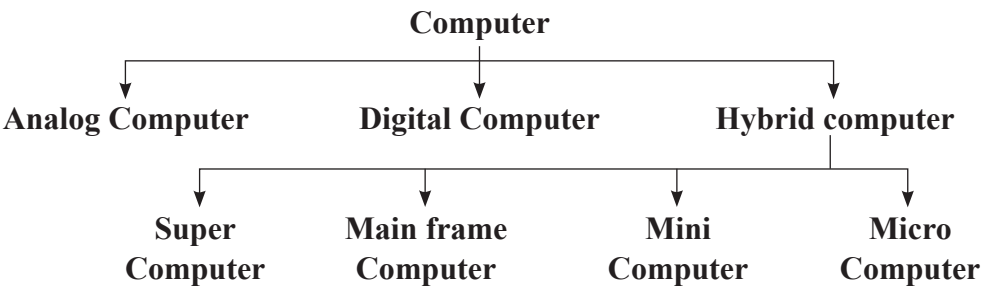
Computers are classified into different categories based on different issues. Computer Systems can be divided into three categories depending technology on the technology used in the computer. For example — Analog Computer, Digital Computer and Hybrid computer. These are explained below —

i) **Analog Computer:** These type of computers perform tasks by measurements rather than calculations, e.g. car speedometer.

ii) **Digital Computer:** These type of computers relies on numerology. In short, this type of computer is a computing device and this type of computer is widely used in general.

iii) **Hybrid computer:** Computers that have both the characteristics of analog as well as digital features are known as hybrid computers.

The type of computer most commonly used today is the digital microcomputer or personal computer. Various classifications of computers are mentioned below -



Computer system can be further divided into four Categories based on size, volume, shape and performance. E.g. – Super computer, Mainframe Computer, Mini Computer and Micro Computer or Personal Computer or PC. These are described as below —

- **Micro Computer:** These computers most widely used computers made up of microprocessors. With the advancement of technology there have been many changes in the shape of these computers. Micro Computers again can be classified into different category. E.g. - Desktop computer, Laptop computer, Notebook computer etc. Micro computer is smallest in size.
- **Mini Computer:** These type of computers are longer, expensive and more powerful in functionality than micro computers. Mini computers were invented to serve multiple users simultaniously and to perform their task,
- **Mainframe Computer:** This type of computer has relatively high storage capacity and processing speed. Due to large number of terminals connected to this computer, many people can use it simultaneously. Banks, Insurance Companies and Railways where there is a need to serve many people at once, there mainframe computers are used.
- **Super Computer:** These types of computers are the most powerful and can perform more complex and large tasks at a fastest speed. Usually this type of computer is used for performing complex scientific and technical tasks and research work.

1.5 Various Features of the Computer System:

A computer is an electronic device. The Salient features of the computer are described below—

- **Speed:** A Computer can complete a complex task quickly according to given instructions. The working speed of a computer is measured in Mili seconds (10^{-3} second), Micro second (10^{-6} second), Nano second (10^{-9} second) Pico second (10^{-12} second), Famto second (10^{-15} Second) and Alto Second (10^{-18} second), etc.
- **Accuracy:** Computers have no other substitutes for accurate calculations. Computers are capable of working uniformly with equal efficiency from start to end of a calculation. However computer gives completely correct results only when there is no error from user's end.
- **Storage Capacity:** A large amount of information can be stored by the computer in its memory or storage area and from there the information can be used further work as required. The information stored in a computer system can be deleted according to given instruction.
- **Deligence:** Computers can perform the same task repetedly and accurately in a short period of time.
- **Automation:** Depending on given required instruction computer can carry out the instruction automatically without any assistance.
- **Versatility:** Computer can performe a variety of task simultaneously. For example one can listen music, copy a file and write a letter at the same time through a computer.

1.6 Structure of a Computer System

A computer system is made up of various components and these components are called computer Hardware. The various parts of a computer are connected to each other through a electrical connection and can perform necessary functions. Generally a computer system is made up of four component or unit. For example - Input unit, Output unit, Central Processing unit and Memory unit. These units are described in detail below—

1.6.1 Input Unit:

The Unit through which data and necessary instructions are given to the computer to complete any task with the help of a computer is called input unit. The device that is used to perform the necessary functions of the input unit is known as input device. Some input devices are discussed below–

- **Keyboard:** It is an input device and is used to provide input directly into the computer to perform a function. The keyboard is very similar to a typical type writer. There are basically three types of keys in the keyboard.

Fig.1.9 Keyboard

1. Numeric keypad : It is consists of 0, 1, 2, ...9, +, -, ×, / keys.
2. Alpha Numeric Keypad: It is consists of A, B, C,.... Z keys.

3. Functional Keypad: At the very top of the Keyboard the 12 keys from F1 to F12 is known as functional keypad.

- **Mouse :** Mouse is also an input device. It is generally used to fix the position of the cursor on the monitor screen. A mouse usually has two buttons, one is the right button and the other is the left button.

Fig.1.10 Mouse

- **Scanner:** It is an essential input device. Any document or picture can be scanned with the help of this device and later the scanned image can be edited if needed. Different types of Scanner are available. For example – Flat bed Scanner, Drum Scanner etc.

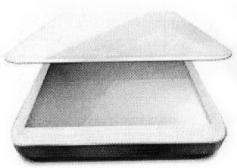


Fig.1.11 Scanner

1.6.2 Output Unit

The unit through which the proper result of after the processing of input data or informataion given to a computer is displayed to us — is known as output unit. The device which is used to perform the necessary functions of the output unit is known as output device. For example Monitor, Printer, Plotter, Speaker etc. are used as output device.

- **Monitor (VDU):** VDU or Visual Display Unit or Monitor is an output device. CRT (Cathode Ray Tube), LCD (Liquid Cristal Display) and LED (Light Emitting Diode) are three types of monitors which are commonly used.

Fig-1.12 VDU or Moniter

- **Printer:** Through this output device any information is expressed in printed form on paper. Different types of printers are available. For example Laser-Jet Printer, Ink-Jet printer, Dot-Matric Printer etc.

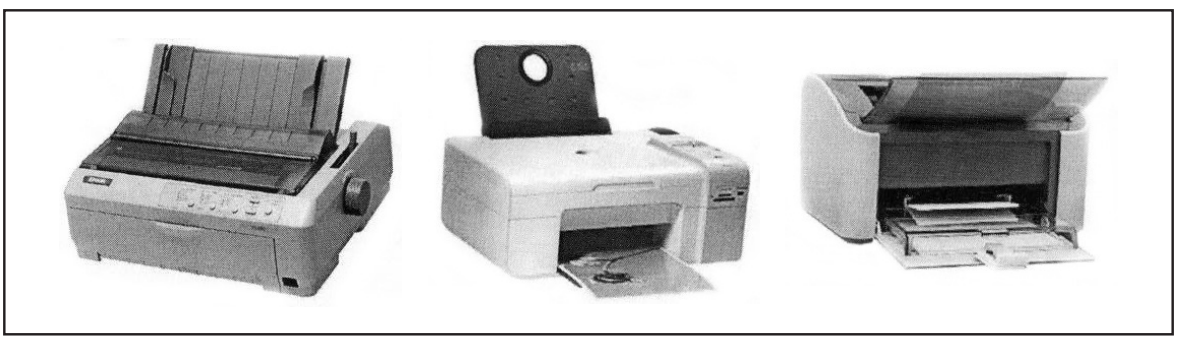


Fig -1.13 Printer

1:6.3 Central Processing Unit (CPU):

Central processing unit is a key part of Computer System. It is actually an integrated circuit (IC) or chip. It usually consists of two subunits, namely Arithmetic Logic Unit (ALU) and Control Unit (CU). These two units are described below—

Arithmetic and Logic Unit:

All types of mathematical and logical operations of the computer are performed by this subunit. It consists of three types of registers namely storage registers, accumulator and adder. Registers are small memory units located within the CPU and used to store intermediate data during CPU – Processing. The storage registers of this Sub unit are used to temporarily store the data and instructions required while performing a task.

Control unit:

This unit controls the processing flow within the CPU. To complete a task, the co-ordination between the required data and instruction is the main function of this sub unit.

1.6.4 Memory:

Through this unit, the necessary data processing in the Computer System is done both before and after the processing and can be mainly divided into two parts depending upon the storage capacity, speed, cost and location. These are Primary Memory and Secondary Memory.

- **Primary Memory:** The memory without which a computer cannot be operated in any way is called Primary Memory. Primary memory generally sub divided into two such as – RAM (Random Access Memory) and ROM (Read Only Memory). The data stored in the RAM is temporary in nature and can be read and write arbitarily. The data stored in the ROM is permanent in nature and no new data can be written in it, the stored data in the ROM can only be read.
- **Secondary Memory:** Apart from primary memory, other less expensive memory used to store huge amount of data into the computer is known as secondary memory. The data stored in this memory is permanent for long term. basis i.e. even if the computer is turned off the information remains in the memory as it is. As Secondary memory is located farther from the CPU than primary memory, data accessing from the secondary memory is much slower than that of primary memory. Floppy Disk, Hard Disk, CD ROM etc. are the example of secondary memory and are described briefly as follows -

‣ **Floppy Disk:** It is like a square disc made of plastic and coated with magnetic oxide on both sides. Generally 3.5 inch and 2.5 inch floppy disks more common in the market. Data is stored in this disk using the magnetizing process.

‣ **Hard Disk:** A type of magnetic disk with a higher capacity to store a relatively large volume of data is known as Hard Disc. Like many floppy disks arranged in a colum, the internal structure of a hard disk is like that. This disk has a read-write head. The entire system is kept in a hard box for security of the hand disk. Nowadays 500GB-1000 GB hard disks are more available in the market. Other than the above units, mother board is specially remarkable in a computer system. The important devices of a

computer system like Processor, RAM, Graphics Card, Sound card etc. are installed in the in the mother board. There are different companies' mother board are available in the market, however Intel's mother board is more popular.

1.7 Software

Computer hardware are cannot operate the computer by itself. The programmes which control the computer hardware and help a computer to run or complete various tasks, is known as software. Depending on the functional area software can broadly be divided into two categories, such as – Application software and System Software.

- **Application Software:** The softwares that are able to perform a various alike functions simultaneously related to a particular job are called application software. For example MS-Word, is capable to perform all the jobs related to would processing.

  Among the application softwares, there are some Softwares which are able to perform only one single task. Such software is sometimes called utility software. For example Partition Magic is an application software which is only responsible for disk partition.

- **System Software:** The software that communicates between the various parts of the computer and acts as a link between the computer hardware and application software is called System Software. The operating systems (OS) like Windows, Linux etc. are example of system software.

1.8 Summary

- Abacus — is called as the ancestor of Computer.
- Charles Babbage, who invented the Analytical Engine, is called the father of the modern computer.
- The computers invented at different times are classified into five generations.
- Depending on the functions computers are divided into three categories into analog, digital and hybrid. The most common type of computer at present is digital micro computer or Personal Computer (PC).
- Information is supplied to the computer through various input devices (mouse, keyboard, Scanner etc.). This data is processed (Central Processing Unit) with other data or information to output logical results displayed or printed through the output devices (monitor, printer, speaker etc.).
- To store various information in the computer, primary memory (RAM, ROM) and secondary memory (Hard disk, Pen drive) etc. are used.

1.9 Unit End Exercise

1) What is computer?
2) Mention the various classifications of computers.
3) Mention the special features of computers.
4) Discuss the comparison among the various computer generations.
5) Draw the block diagram of a computer and describe the functions of different parts of computer.

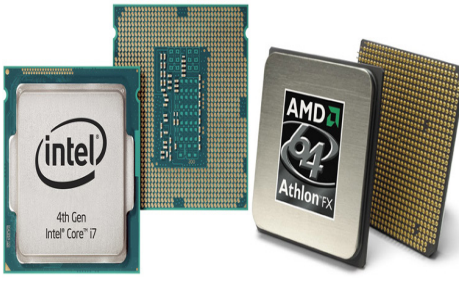
6) write notes on:
   a) Personal Computer (PC), b) key-board, C) Mouse, d) CPU
7) Give example of:
   a) Two input and two output devices
   b) Two devices which used as a input and output device
   c) Two storage devices
8) write the full forum of RAM, ROM, LED, LCD, CRT, VLSI, IC, HDD
9) Give light on fourth generation of computer.
10) Differentiate between analog and digital computer.
11) Write what you understand about input, Processing and output of a computer.
12) What is Pico Second ?
13) Explain the versatility of computer with an example?
14) Differentiate Hardware and Software
15) What is meant by input and output device in computer?
16) Write the names of different printers.

Project work:

a) Write the names of following hardware devices.

(1)

(2)



(3)

(4)

(5)

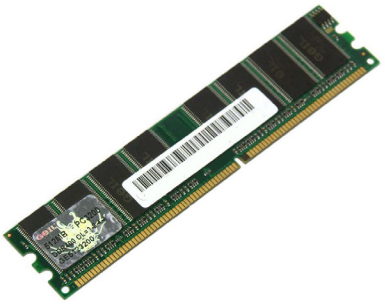
(6)

(7)

(8)

(9)

(10)



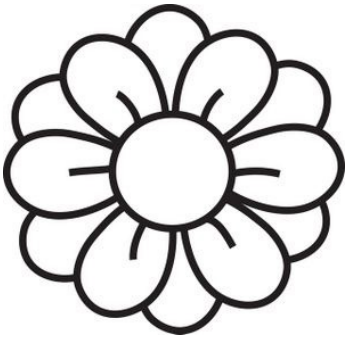
(11)

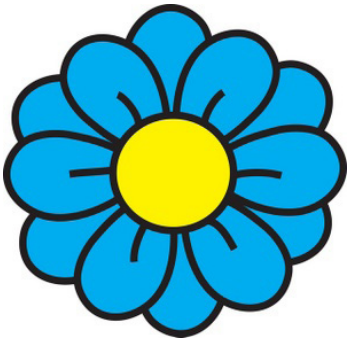
(12)

(13)

(14)

b) Draw the following picture and colour it with the help of MS- Paint using mouse.





UNIT 2

Computer Operating System

2.1. Introduction

This chapter discusses computer memory, operating system and computer network in detail. Memory is an essential part of computer system where various information and various instructions given to the computer are stored. These data and instructions may be provided through various input components, and may also be partial results of intermediate stages during computer processing. When performing a task, the computer takes information and necessary instructions from this memory area. Operating system is a very important part of computer. The operating system controls the components or hardware of the computer and creates a suitable environment to run the programs (software) required for a particular task. In short, the operating system establishes the link between the computer hardware and application software and ensures that the entire computer system can function smoothly. A computer network is a connection system between many computers through which the connected computers can exchange various information (such as written text, words, images, videos, etc.**)** with each other.

2.2 Objectives of the Unit:

After reading of this unit learners will be able to-

- Describe the computer memory and broad classification of memory (primary memory, secondary memory and their classification).

- Identify the characteristics and comparison of primary and secondary memory and different classifications of RAM and ROM.
- Demonstrate the concept and classification of software (system software, application software and utility software).
- Know the detailed information about the operating system.
- Define the computer network and its classification and various network technologies and their advantages, disadvantages etc.

2.3 Computer Memory

Information and instructions are stored in the form of binary code in computer memory. The binary code is 0 and 1. It consists of a type of code on which modern digital computer systems are based. Memory consists of small cells or spaces where information and instructions are stored. These are called cells. In order to get back the information or data previously stored in the memory, the address of the location of the cell in which the information is stored has to be told. In this case, it is not necessary for the user to know the specific address of the bank because the computer's operating system does this automatically. The information or data stored at any address can be used as many times as desired, but when any new information is stored at that address, the previously stored information is deleted. Again. user can delete data from any address as per requirement.

A computer system may use several different types of memory. Depending on the size of the memory, location of the memory in the computer, performance etc., different types of computer memory are classified. Computer Memory can be mainly divided into two parts. For example-

- Primary or Main Memory and
- Secondary/Auxiliary Memory

These are discussed in detail below.

2.3.1 Primary Memory:

Primary memory or main memory can be called the 'real brain' of the computer system. In a computer system, the primary memory is located after the CPU and the data and instructions required for specific tasks are stored here. When a program is executed in a computer system, it must **be** stored in the primary memory at that moment. Because CPU can only directly access programs and data located in primary memory. So without the help of this memory a computer cannot perform any task at all. Different parts of primary memory are again dedicated to perform different tasks.

Primary memory is divided into four parts as shown in the figure below.

Input storage area	**Program storage area**	**WorkingStorage Area**	**Output storage area**
(Before processing data and instructions until is stored here)	(Programs or instructions Stores here)	(Data or program in progress and intermediate results are stored here)	(Results obtained after processing are stored to be presented in output form in this section)

The storage capacity of primary memory depends on how many addresses are in this part and how many bits or information can be stored in each address. There are two types of memory used in primary memory. These are-

- Random Access Memory (Random Access Memory or RAM) And
- Read Only Memory (Read Only Memory or ROM)

Random Access Memory

Random **access** memory is a type of memory in which any necessary information can be read from any location and the information can be written as needed at any location. Random Access Memory or RAM is the part of primary memory where application programs and currently used data stores for processing. All data coming from the input device is stored in RAM for processing. The CPU then processes the data or instructions from the RAM, produces the required results and sends them back to the RAM for storage. By using the address stored information can be read from any location of RAM and new information can be written to any location.

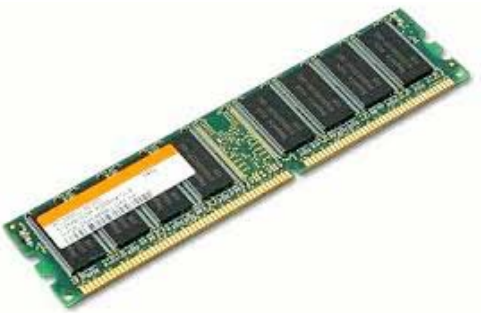


Fig. 2.1 RAM

This reading and writing or Accessing is not done in any specific order, but randomly. That's why this memory is called random access memory. RAM is also called read/write memory because both reading and writing can be done here. Information is stored in RAM on the basis of electrical charge, so when the computer is switched off or the power goes out for some reason, all the information stored in RAM is deleted. RAM is active as long as the computer is running. That's why RAM is also called Volatile Memory.

During computer booting, the operating system is copied from the secondary memory or storage to the RAM located in the primary memory and makes the computer system useful for performing various tasks. In a computer system, RAM is placed in banks in the motherboard. Currently, RAM is available in different storage capacities like 512 MB, 1GB, 2GB, 4GB, 8GB etc. The computer's temporary memory can also be increased by installing additional RAM as needed. Additional RAM is often required to run advanced application programs. The higher the RAM, the higher the speed and efficiency of the computer.

Generally two types of RAM are available. For example-

- Static RAM or SRAM (Static RAM) and
- Dynamic RAM or DRAM (Dynamic RAM)

Static RAM (Static RAM or SRAM)

SRAM is mainly based on bipolar semiconductor technology and each cell of this memory consists of 6 transistors**.** This RAM is very fast and expensive. Because the structure of SRAM is complex and the data capacity is **small**, most computers have a limited amount of SRAM. Usually SRAM is used in cache memory. Data is stored in SRAM in a "static" mode, that is, data is stored as long as the power

supply is on, **so** the SRAM does not need to be refreshed.

Dynamic RAM (Dynamic RAM or DRAM)

Usually DRAM is based on capacitors. This type of memory stores information in a "dynamic" manner and needs to be recharged at regular intervals to keep the stored information **or** data intact. In this case, like SRAM, when the power supply is stopped, all the stored data is deleted. Naturally DRAM is slower than SRAM and DRAM is also relatively cheaper. Most of the computer's primary memory is made up of DRAM. Below are the differences between SRAM and DRAM.

Difference between SRAM and DRAM:

SRAM	DRAM
1. Manufactured using transistor technology.	1. Manufactured using capacitor technology.
2. Information capacity (Storage Capacity) is relatively low.	2. Information capacity (Storage Capacity) is relatively high.
3. Speed is relatively high.	3. Speed is relatively low
4. No need to refresh.	4. To be refreshed at specified time intervals.
5. Relatively expensive.	5. The price is relatively low.
6. Mainly used in cache memory.	6. Most of the primary memory consists of DRAM.

Read Only Memory

Read only memory or ROM is a type of permanent memory where previously stored information can only be read (Read) but no new information can normally be written. A computer system usually has ROM in its primary memory which stores the instructions and code necessary to operate the internal workings of the computer. Based on circuit technology, this memory relies on logic gates rather than electrical charges. Due to this the information stored in ROM is not erased even if the power supply is turned off or the computer is turned off. That is, the information stored in ROM is permanent and for this reason ROM is called non-volatile memory. The data stored **in** the ROM is pre-stored by the ROM manufacturer and cannot be changed by the user. These instructions or programs are known as firmware. System programs stored in ROM, hardware control programs are examples of firmware. Ginbond

Fig. 2.2 ROM

The ROM stores the instructions for the computer to perform predetermined tasks after the power supply is turned on and before the user starts working. These functions performed by ROM are:

1. **RAM Test (RAM Test):** In this process it can be confirmed whether the RAM is working properly or not.
2. **Power on Self Test (Post):** In this method, input devices (keyboard, mouse, disk drive, scanner etc.) and output devices (monitor, printer, speakers **etc.**) are connected to the system and are working properly. is done

3. All ports are notified that the ROM is activated and working.
4. **Booting:** The operating system is loaded from secondary storage (hard disk, DVD, CD etc.) into RAM to make the computer ready to receive instructions from the user. This process is known as booting.

Types of ROM:

ROM can be of different types**.** These are discussed below.

(a) Programmable Read Only Memory: A program can be stored only once in this type of ROM. PROMs are convenient and flexible, but cannot store new information and become unusable once corrupted.

(b) Erasable Programmable Read Only Memory: It is clear from the name that the data or program present in EPROM can be deleted and new data or program can be stored.

EPROM can again be divided into following two parts.

(1) Electrically Erasable Programmable Read Only Memory - EEPROM has all the features of EPROM. In this type of ROM electric pulses are used instead of ultraviolet light to erase information. This type of ROM is usually used where the user's program is stored in the Computer's primary memory

(2) Erasable Alterable Programmable Read Only Memory - This type of EPROM has the advantage of erasing and altering data and does not require the use of any special kind of technology.

(c) Ultraviolet Programmable Read Only Memory : This type of ROM is long lasting and very expensive. Usually this type of ROM is used in cases where information or instructions need to be stored permanently.

▸ Comparison of RAM and ROM

RAM	ROM
1. Existing data can be read in RAM and new data can be written.	1. Information contained in ROM can only be read, but not be written. However, data in EPROM can be rewritten and this requires special programs.
2. Data is temporarily stored in RAM.	2. Information can be permanently stored in ROM.
3. RAM for loading the operating system and other necessary information in the computer is used.	3. ROM is used for Processing required to start a computer i.e. RAM Test, Post, Booting etc.
4 Data stored in RAM is much faster Access can be done.	4. Data **access** speed in ROM is relatively low.

5. Any data or program written by the user is usually stored in RAM.	5. The manufacturer loads the operating system into the ROM.
6. User can easily load or modify data in RAM.	6. Changing data in ROM requires expert.

2.3.2 Secondary/Auxiliary Memory

Secondary memory or storage is a global storage of the computer where a lot of information and graphics can be stored. The new information in this memory is long-lasting, that is, even if the power supply to the computer is turned off, the information remains in the secondary memory. Viewing information and reading stored information in this memory is very easy. However, data cannot be erased if there is no power supply while reading or writing data. Storage of any instruction or data from the secondary memory to the computer's primary memory or RAM and any information or instruction from the RAM can be stored here. This secondary memory can be used as an input/output device. This memory does not have to be inside the computer and in many cases this memory can end up outside the computer. For this reason, secondary memory is also called (external) memory. Instructions not currently needed by the CPU are stored in secondary memory. Secondary memory is also called auxiliary or buxiliary memory because secondary memory is arranged as an aid to primary memory. In a computer system, secondary memory is usually located after primary memory. User can delete old data as well as write new data in this memory. Examples of secondary memory are hard disks, floppy disks, CDROMs, pen drives, etc.

Secondary memory can be divided into two parts depending on the different ways of accessing the information. Such as Sequential / Serial Access Storage Device or SASD and Direct / Random Access Storage Device or DASD. These are described below:

(1) Sequential/Serial Access Storage Device (SASD): In such storage devices, information is organized according to specific rooms. So in this case, both learning and reading are done according to certain rules. These types of storage devices cannot access data randomly from any location, so it takes relatively long time to access specific data. Sided cards, magnetic tapes, cassette tapes etc. are such storage devices.

(2) Direct/Random Access Storage Device (DASD): These types of secondary storage devices can be accessed from anywhere without any sequence i.e. randomly. This is why it takes much less time to access data from direct access storage devices than sequential/serial access storage devices. For example, floppy disk, hard disk, CD-ROM, DVD etc. are such type of storage devices.

Direct access storage devices are again of two types. E.g. Magnetic disk and Optical disk. These are described below

Magnetic Disk - The magnetic disk is spherical and its two surfaces are usually coated with iron oxide. Information is stored in it in the process of magnetization. There are many types of magnetic disks, the most notable of which are silent disks and hard disks.

Floppy Disk - Although its use has decreased a lot nowadays, floppy disk was the most used secondary storage device. until a few days ago. This type of disk has less capacity but is easy to use, cheap and portable. To use. floppy disk a floppy disk drive is attached to the CPU to hold the

disk and allows data to be accessed from the disk. Floppy disk is a circular disk made of flexible plastic with magnetic oxide coating on both sides, the circular disk is placed inside a square plastic jacket and the data is stored on this disk by magnetic process. Among the different types of floppy disks, 3.5 inch and 2.5 inch disks are widely used. Floppy disk storage capacity can be 1.44MB, 2.88MB **etc.** If the magnetic surface of a floppy disk is damaged, the data stored on the disk can be erased, but if properly maintained and used, the floppy disk will last a long time.

Fig. 2.3 Floppy Disk

Hard Disk - A high-capacity magnetic disk inside a computer used to store large amounts of data is known as a hard disk. Hard disk is one of the main components of computer system. It consists of several disks or disks made of metal and coated with magnetic oxide on both sides. Being made of metal, these disks are quite hard, hence the name hard disk. Data is stored magnetically on both sides of each disk of a hard disk. In a hard disk, the disks are connected to a spindle called a shaft. Because this shaft **is** connected to a motor, the hard disk can spin freely at high speeds. Each disk has one Read/Write head for reading and writing data. To protect the hard disk, it is permanently placed inside the computer by encasing it in a metal jacket. Among the secondary storage devices, hard disk has the largest data storage capacity and different storage capacity hard disks are available in the market. A 320GB hard disk is sufficient for personal computers, but if more storage capacity is needed, another disk can be added. With the advancement of technology, hard disks with terabytes or TB storage capacity are now available in the market for storing large amounts of data. The speed of hard disk disks can range from 3600 rpm to 7200 rpm (revolution per minute). Hard disks are quite expensive due to their high speed and large storage capacity.

Fig. 2.4 Hard disk

Optical Disk - Optical discs are very efficient for storing large amounts of data in a low-cost, small volume. Through this type of storage, data is stored and read using laser rays. The most common types of optical **discs** are the Compact Disc or CD and the Digital Versatile Disc or DVD.

Compact Disc or CD - CD is made of Polycarbonate plastic with a thin coating of aluminum on it to form a reflective surface. A CD driver or CD player resides in the computer's CPU cabinet where data from the CD is accessed by inserting the CD. However, CD Writer is required to store data on CD. Currently there are CD drivers available that can do both Read and Write. When writing data to a CD, the laser beam hits specific spots on the reflective surface of the spinning disc**,** creating tiny grooves or holes. Presence of such notch or hole is marked by bit "1" and absence by bit "0". A low-intensity laser beam is shone on the CD in the CD drive to read the information from the CD. The sensor present in the CD drive activates the path of light reflected from the reflective surface of the CD. If

Fig. 2.5: CD

reflected light is reflected from a flat surface then it is identified as 'O' and if it is reflected from a notch or hole then it is identified as '1'. Typically, CDs have a storage capacity of 700MB or more. The types of data that can be stored here are text, sound, video, graphics and graphics animation. There are generally two types of CDs available. Such as CD-ROM (Compact Disk Read Only Memory or CD-ROM) and CD-RW (Compact Disk Re-Writable).

Information on CD-ROM can only be read. Here information can be written only once, no information can be written **a** second time. CD is the cheapest and most widely used storage medium.

CD Re-Writable is a type of storage medium where data can be written multiple times and then erased. That's why this type of CD is comparatively more expensive.

Fig. 2.6 CD driver

Digital Versatile Disk (Digital Versatile Disk or DVD) - DVD is now very popular as an optical disk with a much larger storage capacity than CD. DVD has the same external shape and structure as CD, but DVD has many times more storage capacity than CD. The most commonly used type of DVD today has a storage capacity of 4.7GB. DVD drivers are required to access data from DVDs. A DVD writer is used to write DVDs in the same way as a CD writer.

Fig. 2.7 DVD

2.2.3 Cache Memory

In modern computer systems, one type of memory is used in addition to primary and secondary memory which differ from primary and secondary memory in terms of storage capacity, cost and speed. These are called cache memory. Cache memory is a special type of computer memory that cannot be categorized as either primary memory or secondary memory. The storage capacity of this memory is very less compared to secondary memory but the data accessing speed is very fast. Cache memory is located between the processor and the primary or main memory to increase the speed of processing. In other words, this memory balances the performance of CPU and primary memory. Data and instructions that are used repeatedly by the CPU are usually stored in cache memory, so that these data and instructions do not have to be repeatedly accessed from primary or secondary memory. Since the CPU caches information from memory or instructions can be accessed directly and randomly, thereby speeding up processing. Cache memory can be of two types. For example, primary cache memory and secondary cache memory. The primary cache memory is usually directly integrated with the CPLI. On the other hand, certain parts of any disk storage can be used as cache memory if the CPU can directly repeatedly access the data and programs stored in that part. This type of cache memory is usually called secondary cache memory.

2.3.4 Units of Computer Memory

The computer basically deals with the type of data called character. This character can be any letter (alphabet), numbers (numbers) or symbols (eg, %, ?,+, etc.). Digital computers work according to binary numerology where each character is converted to a binary digit 'O' or '1' before processing. This binary digit is known as Bit. Bit is the smallest unit of computer memory. That is, any memory. And can store as many bits as the memory's storage capacity. For example, saying the storage capacity of a memory is 65,536 bits means that the memory can store a maximum of 65,536 bits (0) **or 1)**. Four

bits together are called nibbles and eight bits together are called a byte. Saying the storage capacity of any memory is 65,536 bytes means that the memory can store a maximum of 65,536x8-5,24,288 bits. A larger unit than a byte is a kilobyte. (Kilo Byte) which is equal to 1024 bytes.

The various units of information or data used in computers are described below.

1 Nibble	=4 Bits
1 Byte (Byte)	=4 Bits (Bits)
1 kilobyte or 1KB=2” bytes	=1024 bytes (Bytes)
1 megabyte or IMB-2 KB	=1024 Kilo bytes
1 GB or 1GB-20 MB	=1024 Mega bytes
1 Terabyte or 1TB-20 GB	=1024 Giga bytes

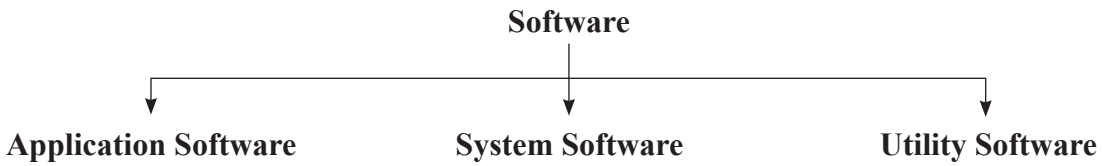
Any letter, number or symbol is considered as one byte of data.

2.4 Software

Before going into the detailed discussion about the computer operating system, it is necessary to know the details about the software. Many instructions or instructions are arranged according to a certain rule (logic) to make a program (Program) for performing a particular task by the computer. When these programs or instructions are executed by the computer hardware, the required task is completed. This form of software consists of one or more programs that are used to accomplish a specific task. For example, Microsoft Word is a software used for word processing. Below is the classification of software described in tabular form.

Classification of Software:

Based on the area of use and function, software can be divided into the following categories-



2.4.1 Application Software

Software that is developed to perform a specific task is called application software. Application software packages can be of different types, below are the names of some application software and the purpose they are used for.

- Word processor software: Word Pad (Word Pad), MS-Word (MS-Word), Word Star (Word Star) etc.
- Spreadsheet software: Lotus 1-2-3 (Lotus 1-2-3), M-S Excel (MS-Excel) etc.
- Database software: MS-Access, Oracle, Foxpro etc.
- Presentation software: MS. Power Point (MS-PowerPoint)
- Desktop publishing (DTP) software: Pagemaker, Corel Draw etc.

Apart from the above application software, there is a type of application software that is used to

perform routine computer tasks and computer maintenance tasks. Such application software is generally called utility software. Examples of utility software are antivirus software, backup software, clipboard manager, file maintenance software, disk defragmenter etc. Any user can use this utility software as per requirement.

2.4.2 System Software

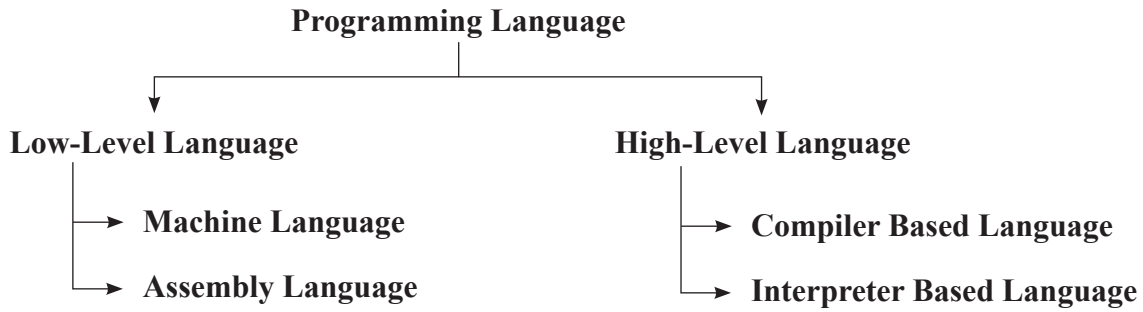
The software that manages the computer system properly by controlling all the functions of the computer and computer hardware is called system software. This type of software acts as an interface between computer hardware and application software. System software is the complex program developed by the specialist without whose presence the computer cannot do any work. Different operating systems, compilers, translators etc. are examples of system software.

2.5 Programming Language

The information and instructions required by the computer to perform a task must be given as input and these information and instructions must be understandable by the computer system. Otherwise performance is not possible. Since the user language is not understood by the computer**, so** a language or sign language is needed to communicate between the computer and the user. Programs are written using this language in a set of rules that the computer can understand. This kind of language is called computer language or programming language. In other words, programming language or computer language is a language through which it is possible to establish a link with a computer machine. For every programming language there are some (grammatical or syntactical) and logical (symantical) rules are fixed. To write a program using any programming language, the user has to write the program in accordance with all the grammatical and logical rules of that programming language. Programming languages are of two types, such as low-level languages and high level language. These are described below.

- **Low-level language -** In this language, programs are mainly written using binary bits i.e. only 0 and 1. Programs written with the help of this language are directly understandable by the computer. Assembly language is an example of a low-level language.
- **High-Level Language -** A language used to write programs in a specific format and in a specific format, usually using the English alphabet, is known as a high-level language. This language is not directly understandable by the machine, but programs written in high-level languages are more understandable to the programmer than to the computer. Because of this, programs written in high-level languages are converted to machine language to make them understandable to the computer before execution. BASIC, FORTRAN, COBOL, LOGO, C, C++ etc. are examples of high-level languages.

Below is the classification of programming languages shown in tabular form.



2.5.1 Translator

A program written in a high-level language becomes comprehensible to a computer only after it is converted into a low-level language or machine language. A translator is software that converts programs written in a high-level language into a low-level language. There are two types of translators, i.e. interpreters and compilers.

(a) Interpreter - Interpreter converts each line of a program into machine language one by one. Although the interpreter takes less time to analyze the source code (program written in high level language). Overall program execution speed is relatively low. If there is an error in any line of the source. code, the program execution stops at that line. So in this case it is easy to correct errors or program debugging. BASIC, Python, Bubi etc. converts a program into code suitable for execution on a computer with the help of programming language interpreter.

(b) Compiler - The compiler scans the entire program together to first create an object program and then creates an execution program to execute the program. In this case, it takes more time to analyze the source code, but overall the speed of program execution is relatively fast. Any errors in the source code are reported to the user at the very time the object file is created. So program debugging becomes relatively difficult in this case. Compilers are used to execute programs written in COBOL, C, C++ etc. languages.

2.6 Operating System

Operating system or OS (Operating System) is a system software that manages the overall functioning of the computer by establishing links between different parts of the computer (Hardware) and application programs. The operating system creates the environment for using application software and provides various facilities for using hardware. Some of the widely used operating systems are Disk Operating System (DOS), Windows, Linux, etc.

An operating system is made up of many pieces of software, each of which performs a specific task. As soon as the computer is turned on, the operating system (OS) checks the primary memory (RAM) to see how much space is available in RAM and locates the start-up disk (the disk that contains the system software) from which the system files are required. by loading into Apart from this, the OS controls the functioning of the keyboard, mouse, monitor, printer, etc. included in the computer system. Thus the OS waits for the user's instructions after making the entire computer system suitable for the user's work. How the operating system establishes the connection between the computer hardware and the computer user is shown in the diagram below.

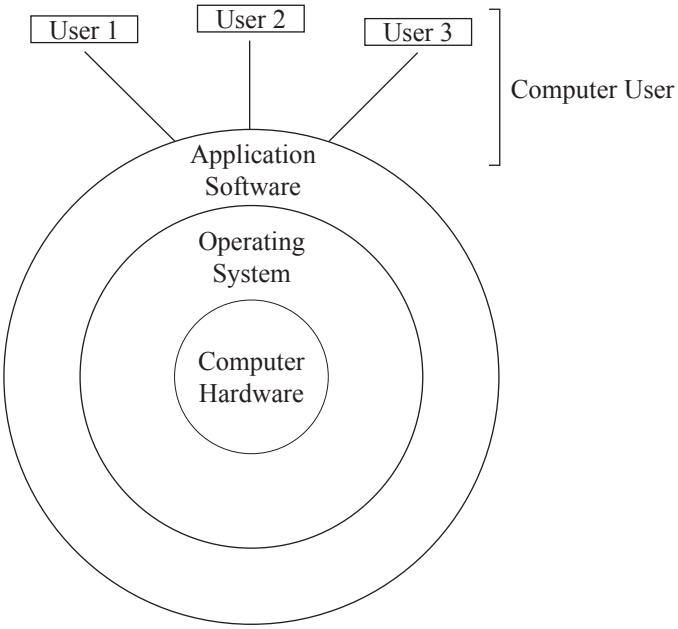


Fig. 2.8 Internal hierarchy of computer

2.6.1 Program Execution:

Here the focus is on how a program or task is processed in a computer system with the help of the operating system. A task can be executed in different ways depending on the classification and capabilities of the operating system. To perform tasks, operating systems generally follow three types of procedures. These are serial processing, batch processing and multi programming. These methods are detailed below.

Serial Processing:

In serial processing, instructions are executed serially. The first instruction given by the system is executed first and then the subsequent instructions are executed sequentially. A source program is first converted into an object program and then it is loaded into the primary memory of the computer with the help of a loader. Then the program starts to be executed and its result is displayed on the computer monitor or printed with the help of printer. Once loaded into memory, the program can be executed as many times as desired, and the output changes as user input changes. The main problem with serial processing is that program execution in this method is very slow and in some cases manual processing is superior.

Batch Processing:

In this case the tasks required for program execution are **first** arranged sequentially. Then similar tasks are combined into one batch (Batch) and executed. Processing various tasks in batch form allows the various parts of the computer system to be used more efficiently. The main problem with this system is the speed gap between fast processors and comparatively slow input and output devices. As a result, if a task is waiting for input at some stage of execution, the processor sits idle until that input is loaded.

Multi Programming:

Although batch processing can make various parts of the computer more efficient, the CPU remains idle during batch preparation. It is never possible for a single user to keep the CPU or input and output devices busy all the time. Multi-programming is very useful in this case where it is possible to keep the input and output parts of the CPU very busy by running multiple programs simultaneously. In a multi-programming system, multiple programs are loaded into the main memory of the computer system. The operating system starts to **run** a program from among these programs. In the **case** of sequential execution (Sequential Execution) the CPU sometimes becomes idle, but in the case of multi- programming the CPU can execute other programs. As a result, it is possible to keep **the** CPU very **busy**.

2.6.2 Functions of Operating System

Operating system is actually a collection of many small pieces of software and each of these pieces of software performs a specific task. The tasks performed by the operating system as a whole are described below.

Processor Management

In the case of multi-programming, the operating system determines how long a program can use the processor during execution. Processor management is the most efficient use of the processor during program execution. Computers today have multiple co-processors to assist the main processor. E.g. Math co-**processor** (for any mathematical work), graphics co-processor (for graphics work) etc. Proper use of these co-processors with the main processor increases the speed of program execution. When a task is given to the computer, the operating system divides the task between the processors and co-processors and thus completes the task in a much shorter time.

Memory Management

The operating system determines how much of the computer's memory will be used by the system, how much will be allocated to user-supplied data or programs, and how it will be used. When multiple programs are running simultaneously, how much memory is allocated to which program is called memory management. The two main features of memory management are Protection and Sharing. Protection is to maintain the necessary distance between each memory address so that multiple. processes do not load at the same memory address. Sharing is the sharing of common data by multiple processes. If there is an inactive process in the memory, the task of sharing is to remove it and load an active process **in** that part of the memory.

File Management

File management is the maintenance of various data and programs stored in secondary memory. Operating system file management programs help user programs read, write, or create new files to other files.

Input/Output Management

With the help of input/output management, the operating system controls the operation of input and output devices like keyboard, mouse, monitor, printer etc. The operating system provides commands

and assigns specific tasks to various I/O devices. It is also the job of the operating system to correct any errors found in the devices.

Security Management

This feature of the operating system protects the stored data from intentional or unintentional modification. Key Features of Security Management are-

(1) No more than one file or folder with the same name can be created in the same location.

(2) Different files or folders can be protected with the help of **password**.

(3) Multiple files cannot be created at the same memory address.

Device Management

Various devices or devices connected with the computer can be properly used for this feature of the operating system. As soon as the computer is turned on, the operating system collects information about the components connected to the computer. For example, the operating system recognizes the keyboard as an input device and the monitor as an output device. As a result, some peripheral devices cannot be opened and a new one installed while the computer is running. After turning off **the** computer, plug in the new device and restart the computer.

2.6.3 Common Operating Systems

Currently there are various operating systems available in the market out of which some of the popular and widely used operating systems are described below.

Disk Operating System

Disk Operating System (DOS) using the tight link between computer hardware and software creates an appropriate working environment by providing the user with the facility to use 'text' based commands. The most common and popular version is Microsoft DOS or MS-DOS, which was developed by Microsoft Corporation in 1981 specifically for the IBM-PC. Apart from Microsoft, IBM company also developed DOS which is known as PC-DOS. The main functions of DOS are:

(1) Controlling the operation of various application programs when they are used on a computer.

(2) Disk management i.e. making the disk suitable for storing information (eg formatting the disk, copying etc.**)**

(3) Automatic execution or batch processing i.e. helping to automate repetitive tasks through EXE or BAT files.

(4) Controlling important functions like Print Management and Resource Management.

Windows Operating System

Everything in DOS is done by typing commands, which causes the user to remember a lot of instructions and how to use them. This operating system does not have any graphics or picture instructions. Due to these reasons the popularity of DOS has decreased a lot. Windows operating system is created by removing all these limitations of DOS. The first version of Windows made by Microsoft company was

released in 1985. But this version had many limitations. Windows 3.1 was the first successful version of Windows in 1992. In 1995, Microsoft launched Windows 95 which gained huge popularity. Later versions of Windows are Windows 97, Windows 98, Windows ME, Windows NT, Windows 2000, Windows 2003, Windows XP, Windows 7, and Windows 4. The latest version of Windows is Windows 10.

Advantages of using Windows are discussed below.

(i) Graphical User Interface or GUI: Windows is a GUI so that there is no need to write or remember any commands like DOS. Due to the facility of giving instructions, information, etc. through images, the necessary work can be completed by clicking the mouse.

(ii) Object Linking and Embedding (OLE): With the help of OLE, content from one application in Windows can be selectively used in another application and the content can also be linked between the two. As a result, any change in one subject automatically changes the other subject.

(ii) Advantage of Multi-user: In advanced versions of Windows (Windows NT, Windows XP) multiple users can work simultaneously.

(iv) Advantage of Multitasking: In Windows operating system a user can complete multiple tasks simultaneously.

(v) Dynamic Data Exchange (DDE): DDE facilitates data exchange between software running on Windows.

(vi) Open Database Connectivity (ODBC): Using ODBC on Windows, **a** database created by an application can be created as well **as** used by other applications.

(vii) Plug and Play: This feature does not require installing any software separately to add peripherals. like CD-drive, monitor, sound card, speakers etc. to the computer.

Linux Operating System:

Like Windows, Linux is also a multi user, multi tasking operating system. On the basis of work, this operating system can be divided into four layers - kernel (kernel), shell (shell), file structure (file structure) and utilities (utilities). Chief among these is the kernel, which runs programs and manages. various hardware components. In 1992, Linus Tor released the Vald kernel. A company called GNU adds shells, file structures, utilities to the kernel to make it a complete operating system. The shell protects the connection with the user. It receives instructions from users and passes the instructions to the kernel. File structure determines how files are stored on disk. Initially Linux operating system commands were large. Currently using GUI on Linux. The main feature of Linux is that it is an open source operating system. Since it is open source, everyone can freely use it and make changes as needed. Since Linux is easily available on the Internet and open to all, it usually costs nothing to download it to your machine. If you have to buy the Linux CD from the market, the cost is also very low. Linux is much more resistant and secure than other operating systems when it comes to virus attacks.

2.7 Computer Network

When two or more autonomous computers are connected to each other through a special medium and are able to exchange information with each other, the entire system is called a computer network. Computers on a network are autonomous, meaning that one computer can never control another computer. In case of network, the communication medium of computers can be cable, optical fiber cable, microwave, satellite etc. Computers connected to the network are called nodes (Node) or work stations (work stations) and the connection medium is called Communication Channel. Not only computers but also other peripherals can be connected to the network system. The advantage of networks is that the connected computers can be of different types and capabilities. Information exchanged over a network can be written text, words, images, etc. Nodes in a network **can** use shared software and hardware. But the network does not work if the connectivity between them is disrupted. Adequate funds are needed for the necessary equipment and maintenance of the network.

2.7.1 Advantages of Computer Network

The advantages of computer networks are described below.

Resource Sharing: Various programs, expensive devices (such as printers, scanners, etc.) and data or information can be used by users from all computers located in the network.

High Reliability: Since important files can be stored on multiple computers in the network, as a result, if one computer fails, all those important information can be used from another. That is, because there are alternative sources of information, its credibility is high.

Scalability: Additional processors can be used to maintain or increase the performance and efficiency of the network system when the workload increases. As a result, additional work load can be handled.

Easy Communication: Using the network, two or more people or different organizations can easily communicate with each other and exchange information. One can keep in touch with others **at** any time using network services such as e-mail, video conferencing, chatting etc.

High Security: Information in the network is sufficiently protected. No one can destroy it at will. Money Transaction: Using the network, a person can easily perform various bill payments, manage bank accounts and investments. At present stock market, computer network is non-operational.

Home Shopping (Home Shopping): Necessary items can be bought at any time by establishing contact with various organizations or companies present in the network.

Information Collection and Use: Nowadays it is very easy to collect, gain knowledge and use various information using the website for various purposes, such as industry, commerce, health, related to education, history**,** science**,** sports, travel etc.

Entertainment: The use of network services for entertainment is increasing. Music via internet listening, watching movies, playing games **etc.** is very easy now.

2.7.2 Network Architecture

Based on what type of computers are in a network, what is the purpose of the network, how big is the network, whether there is any central control system etc. A Computer networks are divided into two main categories - Client-Server Network and Peer-to-Peer Network. These are described below:

Client-Server Network

This type of network has a central computer with high efficiency and high storage capacity called server. This server is used to control central systems, share hardware and software, and protect information. Other less powerful computers or workstations on the network are connected to this server and are called clients. The user can access the data sent by the server only through the client. Client-Server Networks are mainly used for data and resource sharing. Almost for all the work the required data and software are kept on the server. Client computers connected to the server can use this data and software. However, permission is required to use it and the server has a specific account and password. for each client computer. Servers are of different types depending on the function, such as file servers, print servers, message servers, database servers, application servers, etc.

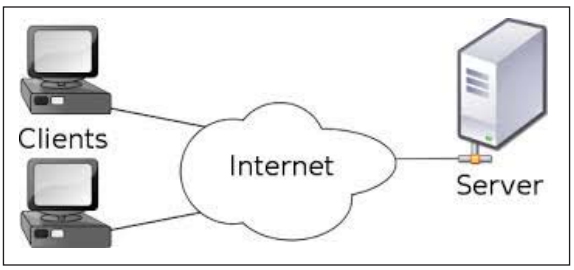


Fig. 2.9 Client Server Network

The advantages and disadvantages of client server network are recorded below.

Benefits:

(i) All computers in such a network can access data, programs and printers from the server seamlessly.

(ii) In such a network the task of network control and maintenance becomes much easier as the server manages the entire network.

(iii) The security of this network is strengthened as the control of all important data and software is in the hands of the System Administrator. As a result, no computer on the network can change or destroy them.

(iv) Most client-server networks have special arrangements for backing up servers, and in many cases this process is automated.

(v) Servers in client server networks have multiple disks, so if one disk fails for any reason, another disk can be used.

(vi) A client server network can have thousands of users. A peer-to-peer network cannot have such a large number of users.

Disadvantages:

(i) In this type of network the whole network is controlled by the server so if the server goes down then the whole network goes down.

(ii) This network system is complex. Installing the operating system on the server, configuring it for each computer on the network, configuring the server programs, setting up security systems-all these things take considerable time and effort.

Peer to Peer Network

The main characteristic of this type of network is that there are no servers and every computer in the network has equal importance and responsibility. Each computer can act as **a** server and client simultaneously. If one computer is allowed to share the data on disk, other computers can use that data or exchange data. The advantages and disadvantages of such networks are recorded below.

Benefits:

(i) The structure of this network is very simple and straightforward.

(ii) No servers are required in such networks and there is no need to install any software separately or configure them for the network. So there is no need for System Administrator.

Disadvantages:

(i) Peer to peer network has no central control system.

(ii) Data security measures are almost non-existent in such networks.

(iii) Peer-to-peer network has no provision of data backup for entire network. As a result, each computer needs to be backed up separately.

(iv) Such networks are not ideal for long distances.

(v) Large number of users cannot be connected to such network.

2.7.3 Network Topology

In order to exchange information between computers and other devices on a network, they must first be connected to each other. The geometric arrangement of how computers and other devices are connected in a network is called network topology.

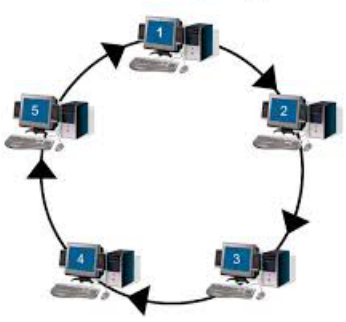


Fig. 2.10 Network Topology

Network topology can be of the following types. For example:

- Bus Topology
- Star Topology
- Ring Topology
- Mesh Topology and
- Tree Topology

The components required for different topologies are also different. Also, the method of exchanging data through the network is different for different topologies. So selection of proper topology for any network is very important.

- **Bus Topology**

Bus topology is the simplest topology. In this case the computers are connected with a main cable. This main cable is called trunk or backbone. In this topology, data is sent from one computer to

another computer's address through electronic signals. As this signal passes through the trunk, the data goes to the computer whose address matches the data's address. In bus topology only one computer can send data at a time. So when one computer starts sending data, other computers have to wait. As the number of computers in the network increases, the amount of this queue increases, resulting in delays in sending data. In bus topology, even if one computer goes down, there is no problem in sending data to other computers. But if one part of the trunk goes bad, all the computers on the network after that part become isolated from the previous computers. The bus cable alone connects all the nodes, so this topology requires short cable lengths. Although the bus topology is simple, fault finding is very difficult.

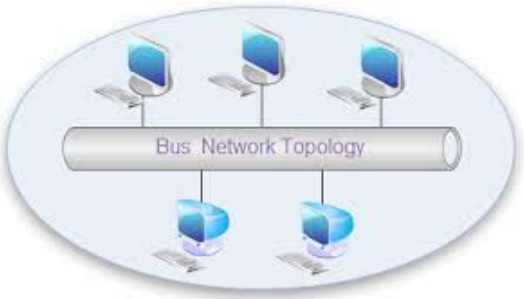


Fig. 2.11 Bus Topology

- **Star Topology**

In star topology computers are connected to each other through a network device. This central device is called a hub. The hub controls the network here. Figure 2.12: Star Topology The signal from the computer sending the data first arrives at the hub and then from the hub to the other computers. An advantage of star topology is that data exchange is centrally controlled through hubs. This is also inconvenient because if the hub is down, the entire network goes down. However, like bus topology, the network works even if one of the computers goes bad. Additional computers can be added in a star topology. A hub can typically accommodate 4, 16 or 32 computers. If you want to connect more. computers than this, you have to connect another hub with the hub. A second hub can accommodate many more computers. In this way the network can be extended by installing multiple hubs.

Fig. 2.12 Star Topology

- **Ring Topology**

In a ring topology**,** computers are connected to each other in a circle. There is no such thing as a circular bus topology. There are no free ends. A signal sent from one of the computers in this topology. It goes through every computer on the network. As a result, each computer has control over the signal. After a signal arrives at one computer, if that computer releases the signal, it can pass to the next computer. with each device located within the ring. One repeater is connected. If a computer receives a signal and finds that the signal is not for that device, the repeater associated with that device amplifies the weak signal and sends it to the next computer. Ring topology is much easier to deploy than other topologies. This is because each device is connected to its neighboring devices to make any changes to the network type, only two connections need to be changed. The disadvantage of ring topology is that if one computer goes down, the entire network goes down.

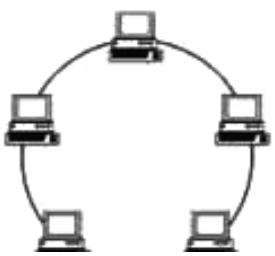


Fig. 2.13 Ring Topology

- **Mesh Topology**

In a mesh topology, each computer is separated from every other computer by a cable are connected separately. Mesh topology is most reliable for data exchange. From a computer to which data is to be sent, the data can go directly to that computer or through another computer to that computer. The advantage here is that since one computer is connected to another computer in all possible ways, even if one of them is disconnected, the data can reach the correct address in the other way. The main disadvantage of this type of topology is the number of wires and I/O ports the number is much higher. As the number of computers increases, the number of cables increases exponentially. So creating such a topology becomes very complicated if the number of computers is very large or if the computers are spread over different places. Deploying such a topology is very expensive.

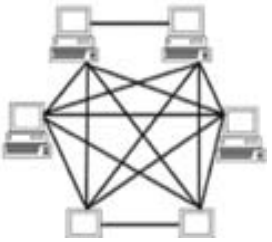


Fig. 2.14 Mesh Topology

- **Tree Topology**

As the name implies, nodes are located at several levels in a tree topology. The first layer consists of the main computer which plays the role of server. Client nodes are connected via cables to the host computer at the next level. Again the branch nodes of those nodes are located at the next level which are connected to that node through cables. Thus one level node acts as the 'parent' of the next level node. In this type of topology, each node has direct or indirect communication with the main computer and nodes at different levels. This network is also called Hierarchical network. Tree network topologies can span relatively large distances. In this case network expansion is easier because such networks are divided into sub-branches. Fault detection and correction is easier in this type of network because it is easy to isolate one or more nodes from the main structure. The main disadvantage of this topology is that if the main computer fails, the entire network becomes useless. The structure of this type of network is relatively complex and so is the speed of data flow.

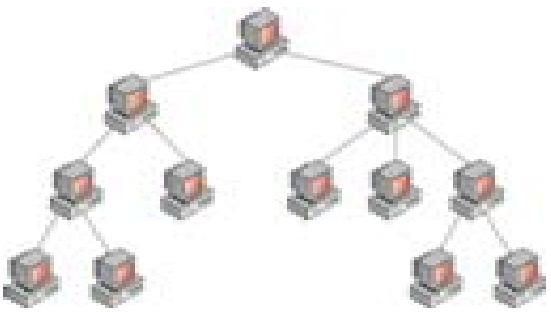


Fig. 2.15 Tree topology

2.7.4 Types of Computer Network

There are mainly two types of computer network based on geographical location. For example-

- Local Area Network (LAN) and
- Wide Area Network (WAN)

There are also Metropolitan Area Networks (MANS) which are actually larger versions of LANs.

- **Local Area Network (LAN)**

Server LAN is the backbone of any computer network. A network system organized by a relatively small number of different types of computer systems (computers and peripheral devices such as printers, modems, etc.) located geographically at a short distance and exchanging information through wires or cables is called a local area network or LAN. LAN distance is a consideration because computers are

usually connected via cables. The span of LAN is usually from 10 meters. is within kilometers. All computers in an organization or all computers within an apartment building, or even all computers in multiple apartment buildings side by side, can be connected using a LAN. Generally Co-axial cable is used in LAN. Generally LAN speed i.e. data transmission rate is 10-100 Mbps (Mega bits per second). Computers connected to a LAN are connected through various network topologies (Bus, Ring, Star etc.). The main advantages of LAN are that the structure of the network is simple and easy, the cost of construction and maintenance is low, and users can share all computers and peripherals (such as printers, hard disks, modems, etc.).

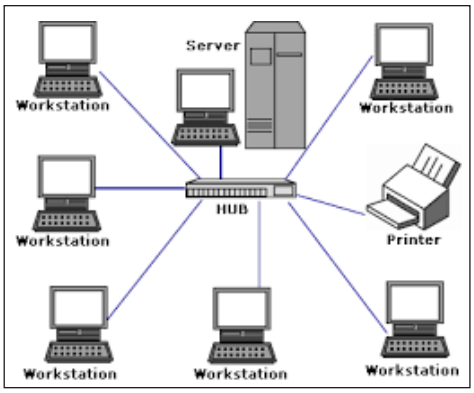


Fig. 2.16 LAN

- **Metropolitan Area Network (MAN)**

MAN is a larger version of LAN. A network formed by connecting different edge computer systems. located within a large city is called a MAN. So a MAN is a combination of multiple LANS located in the same city. Here too generally the same technology as LAN is used. MAN can span up to 10-20 km and its data transmission speed is lower than LAN. Computers are connected in MAN by coaxial cable, fiber optic cable etc. The structure of MAN is more complex than LAN and the cost of data transport is also higher.

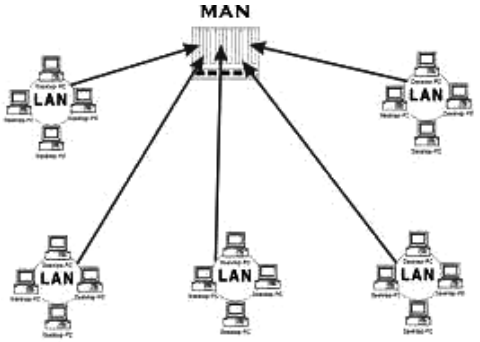


Fig. 2.17 MAN

- **Wide Area Network (WAN)**

Such network systems span over wide areas. Indeed geographically distant LANS or MANS are connected together to form the resulting network system WAN. Such networks may span a country or a continent. Distance is naturally a major consideration here. Hence the medium of communication also varies and in many cases multiple mediums are used. In most cases telephone lines and microwave and satellite communication systems are used for WAN. In addition, undersea leaf cable lines are also used. WAN is the only way to protect the communication between the whole world. The Internet is the most prominent example of a WAN. In WAN cost in comparison with the efficiency and the advantages. obtained from the network is low.

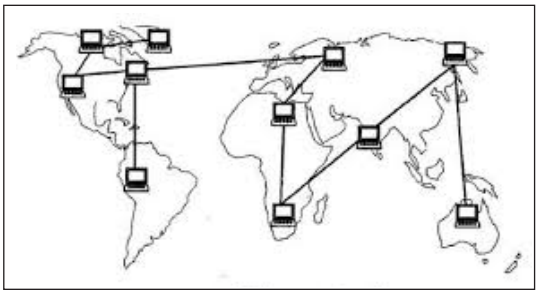


Fig. 2.18 WAN

2.8 Summary

- This chapter discusses in detail about computer memory, operating system and computer network.
- Data and programs are stored in computer memory. Generally memory is of two types primary and secondary. Primary memory is the real brain of the computer without which the computer cannot function. Primary memory has two parts - temporary memory or RAM and permanent memory or ROM. A lot of information and programs can be stored in the secondary memory of the computer for a long time. Again data can be deleted from here very easily. Hard disk, floppy disk, CD-ROM, DVD etc. are known secondary memories. The smallest unit of computer memory is BIT or Binary Digit
- A computer operating system is the system software that controls the overall functioning of the computer. Without an operating system, no work can be done with computer hardware or programs. The operating system controls the hardware and creates the execution environment. DOS, WINDOWS and LINUX are three widely used operating systems.
- A computer network is a system of connections through which two or more computers exchange information and share resources with each other. The computers **in** the network are called nodes or workstations and the connection medium is called the communication channel.
- According to the architecture of the network, computer networks are of two types: client-server network and peer-to-peer network.
- Topology is the geometric arrangement of computers and other devices in any network. Common network topologies are bus topology, star topology, ring topology, mesh topology, and tree topology.
- Computer networks are of three types based on the size of the network. These are Local Area Network (LAN), Metropolitan Area Network (MAN) and Wide Area Network (WAN). Computers located at short distances is connected via LAN. Generally computers in different locations in a big city are connected through MAN. WAN expansion is global. The best example of a WAN is the Internet .

2.9 Unit End Exercise

(1) What **is** computer memory used for?

(2) What is RAM ROM?

(3) How many types of ROM and what are they?

(4) What is the need to use secondary memory in a computer?

(5) Why is RAM called temporary memory?

(6) What does booting mean?

(7) Describe a hard disk with pictures.

(8) What does Cache Memory mean? What is this memory used for?

(9) What does Software Hardware mean?

(10) What is Utility Software?

(11) What is programming language?

(12) What is operating system?

(13) What is meant by serial processing and batch processing?

(14) Describe the functions of operating system.

(15) Write the advantages and disadvantages of computer network.

(16) What are the network requirements?

(17) What is network topology? Describe various network topologies with pictures.

(18) Describe LAN, MAN and WAN with pictures. Write down their advantages and disadvantages.

(19) **Write the difference:**

RAM & ROM, CD & DVD, System Software and Application Software, Compilers and Interpreters, Client-Server and Peer-to-Peer Networks, LAN and WAN

(20) **Write short Note on:**

Primary Memory, ROM, Hard Disk, CD-ROM, Application Software, Multi Programming, Secondary Storage, Linux, Star Topology, MAN, Computer Language.

(21) **Write full name:**

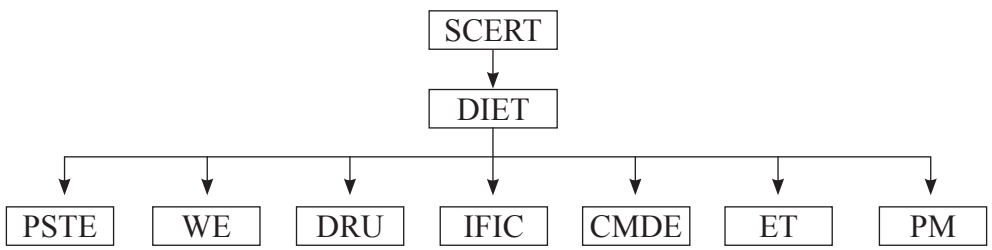
RAM, ROM, EEPROM, UVPROM, POST, SASD, CD-ROM, DRAM, DVD, GUI, LAN, WANI

Project Work

(1) Identify the different parts of the computer used in the computer lab.

(2) What type of computer network is present in your computer lab? Give reasons in favor of the answer.

(3) Create folders in WINDOWS Desktop according to the structure below.



UNIT

3

Word Processing System in Computer

3.1 Introduction

The softwares which provides all the facilities (like cut, copy, paste etc) of text editing or processing and convert text into various formats are known as word processing software or word processing package. In short all the facilities required to create a document or report are available in a word processing software. There are various word processing packages are available in the market out of which the most used word processing package is Microsoft word or MS word which is a part of MS Office. MS word is a application software using which one can create a document by text writing, text formatting, sharing and printing.

Different types of word processors are available in the market out of which popular word processors are Star, World perfect and Microsoft word.

3.2 Objectives

After reading of this unit learners will be able to -

- Acquire the knowledge of word processor and word processing.
- Describe the general features of word processing in a computer.
- Describe what is mail merge and how to use it.

- Create various documents, editing and printing of a document and storing it for future use, etc.

3.3 Some General Characteristics of Word Processing

Word processing program provides all sort of activities to create a document into a computer. In other words a document can be created efficiently in the computer using a word processing program. General characteristics of a word processing program can be classified into different categories such as basic features, desktop publishing features, language features and web features. These features are described in detail below -

Basic features:

Writing of text and editing of text can easily be done using this feature of word processing. The facilities. provided by the basic features of word processing to create a document are

- Sharing of document to use in future
- Saving of document in different formats to use it in different medium such as RTF (Rich Text Format), PDF, HTML, etc.
- Insertion of new text or deletion of text in a document.
- Searching of text and replacing of text in a document.
- Copy of text document and shifting of the document from one place to another.
- Word wrap around that is automatically shifting of cursor from end of a line to the next lower line in a document without pressing enter or return.

Desktop publishing features :

Arranging of document, report, newsletter, handout etc can be done very beautifully using desktop publishing features of word processing. The facilities provided in these features of word processing are described as below–

- Provide the alignment and justify facility
- Provide the facility to use fonts, style, colour, margin, line spacing etc of text in a document.
- Provide the insertion facility of header, footer and page number in a document.
- Provide the facility of insertion of picture, graph, chart etc in a document.

Language Features:

This features help to apply proper grammar. The facilities provided in these features are described as below -

- Spelling check and correction of every word in a document.
- Use of alternative words or synonyms in a document
- Provide help to apply appropriate language and proper grammar in writing a document.

Web Features:

With these features of word processing award document can be connected to the internet. The advantages provided by these features of word processing in creating a word document are described as below-

- Helps to insert a live URLs into a document so that the document can be linked with the internet and web resources can be used within the document.
- Helps to create the web pages.

3.4 Working with MS Word

To create a document by opening MS word, the following steps are to be followed -

- Click on the start button in the windows
- Select programs from the menu appears

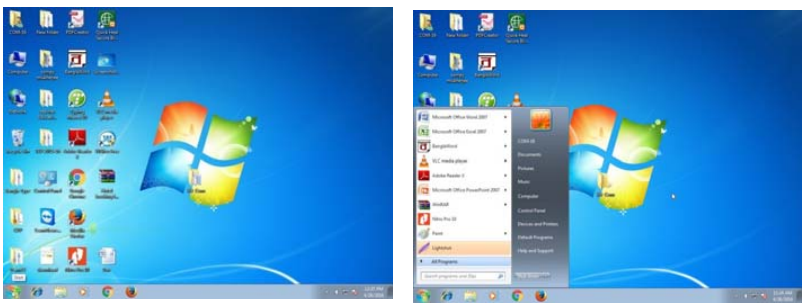


Fig. 3.1 Opening MS Word

- From the list of application programs that will appear, bring the mouse pointer on Microsoft word and click once to open the Microsoft word window or page. Now on these page you can create documents as needed. However, to create a document using MS word, you first need to know about MS word window. It is described below

3.4.1 Introduction to Word Window:

Before working with a document, it is necessary to know the screen of Microsoft word properly. Components appearing on these page are discussed below -

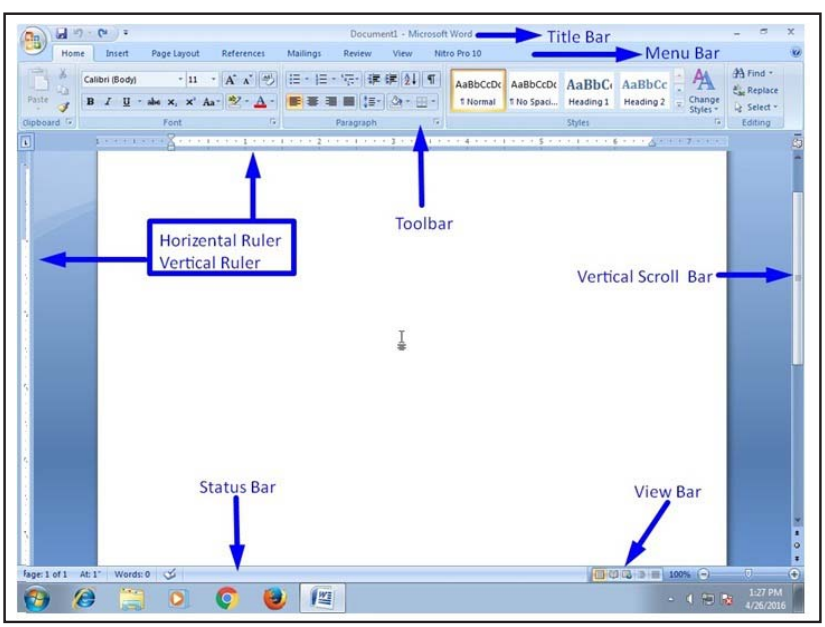


Fig. 3.2 MS Word Window

- **Title bar -** the name of a document along with the text "Microsoft Word" is displayed in this bar.
- **Menu bar -** with the help of this bar different commands can be used by opening different menus and the necessary functions can be completed.
- **Toolbar -** using this bar various commands under special groups can be used.
- **Vertical scroll bar -** with the help of this bar one can move upward or downward of the document.
- **Horizontal scroll bar -** using this bar one can move towards the left or right of a document.
- **Split bar -** using this bar the word window can be divided into two or more parts so that the various portions of the document can be viewed simultaneously.
- **Status bar -** various information of a document such as total number of pages, current page number, cursive position etc. are shown in this bar.
- **Next Page & Previous Page -** clicking on this one can move to the next page or previous page of the document accordingly.
- **View button -** it helps to present a document in various forms (such as normal, web layout, print layout, outline etc).

3.4.2 Creating a New Document

To create a new document using MS word the following steps are to be followed ---

1. Click on the button file menu.
2. Dialogue box will appear as shown below and click on blank document icon from the digital box.
3. Finally click on okay button and a new document will be created. Now it is required to type the content or text.

File → New → Open a dialog box → Blank document

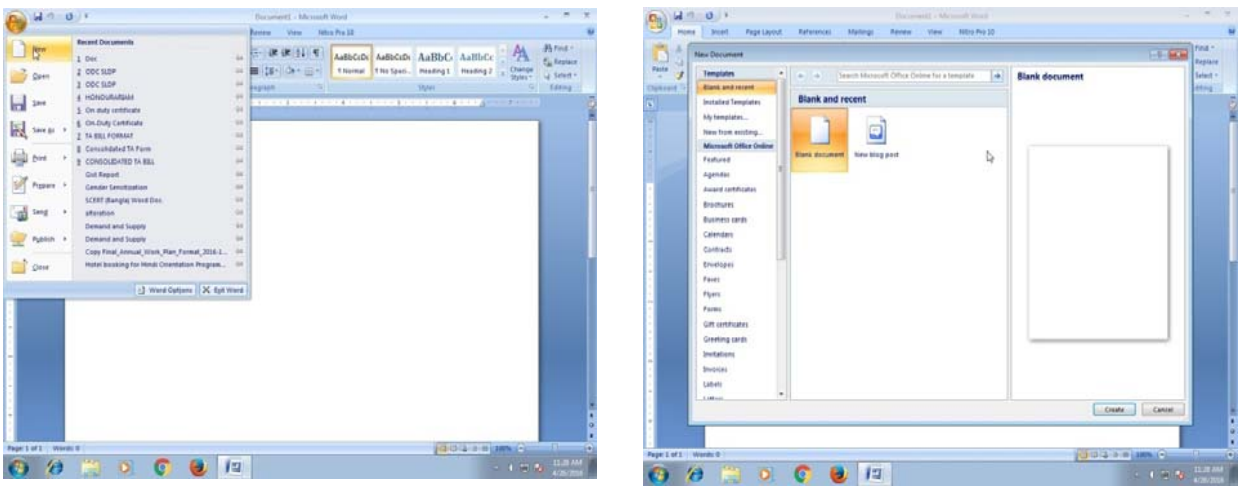


Fig. 3.3 Creating a New Document

3.4.3 Saving a Document

New document or file must be saved after finishing the job. Otherwise the new document will be deleted as soon as the computer is shutdown. In this case both the options save and save as are basically used to save the / document. With option save, a document can only be saved to a specific location on the computer. On the other hand, a document can be saved to different locations (such as desktop, C drive, D drive etc.) On the computer by the option save as. First clicking on file menu select save or save as dialogue box and save the file or document by providing the name of it. File or document can also be saved with the help of the keyboard. In that case pressing Ctrl + S or F12 will open save or save as dialogue box respectively. The procedure to save a document is shown as below -

File → Save/Save As → Chooses the location/Default location → Put a file or Document name → Save

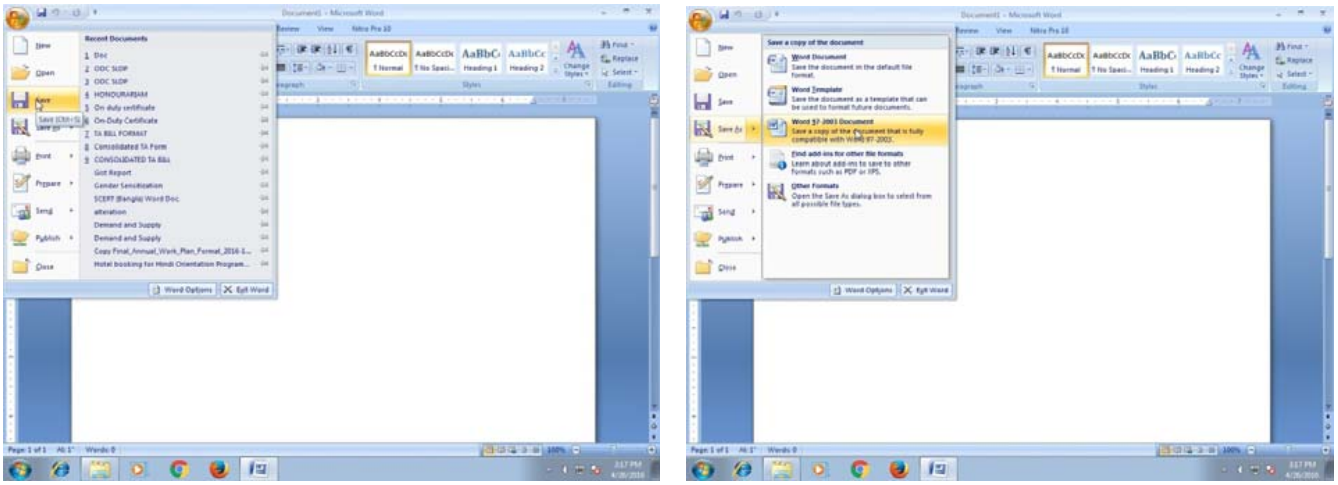


Fig.3.4 Document Saving

After saving a document in MS word the extension of the file or document will be doc or docx.

3.4.4. Opening a Document

To read or edit any document, the document is to be open first. To open a file or a document select open from file option and then click on the file name from its own location. With the help of keyboard press Ctrl+O to open a document. The procedure to open a document is shown as below -

File → open → Select the drive name (location) → Select the file name which we want to open → Open

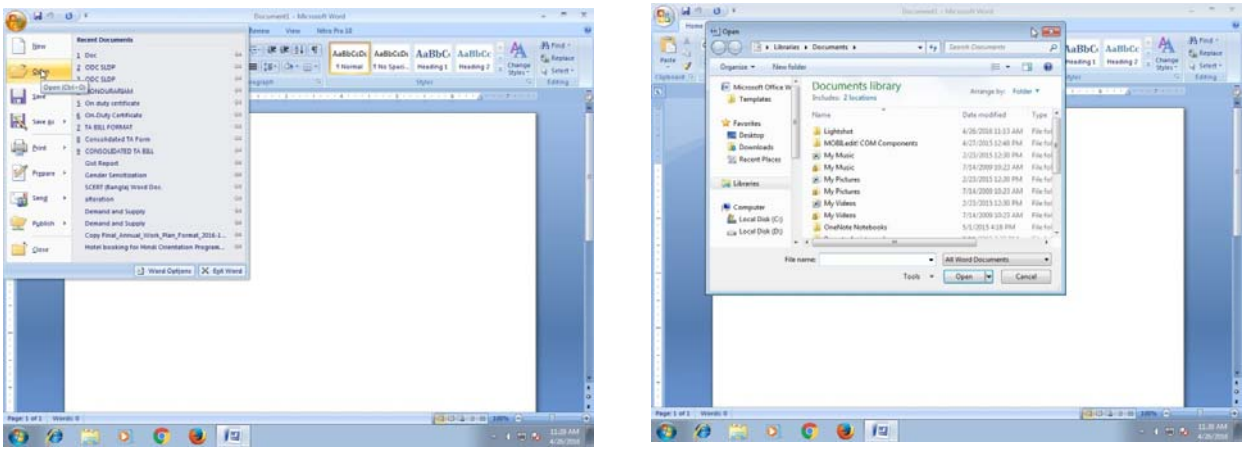


Fig. 3.5 Opening a Document

3.4.5. Editing a Document

If something needs to be changed after creating a document, then something new can be added to the content of the document or some portion of the content can be deleted from the document. In this way the content of the document can be changed by inserting or deleting new text. In addition, some portion of the content of the document can be replaced and new text can be added. This process are called document editing. Various options for editing a document in MS word are discussed below–

- **Copying :**

  It is possible to copy a part of a file or a document from one place to another. The part to be copied can be copied by selecting the part with the help of editing bar or by pressing Ctrl+C button on the keyboard. Now the selected part will be copied to the specified position of the document after placing the cursor to the specified position and using editing bar or by pressing Ctrl+V button from the keyboard. It is also possible to copy the selected part into another document.

- **Pasting :**

  It is possible to cut or copy some part of a file or document and paste it to another location or in another document. This can be done with the editing bar or by pressing Ctrl+V button from the keyboard.

- **Deleting :**

  It is possible to delete or clear an unneeded part of a document. This can be done by pressing the delete key or backspace key from the keyboard.

- **Subscript and Superscript :**

  During writing many times it has to be written a letter or a number below or above another letter. The letter written below is called Subscript and the letter written above is called Superscript. For example in A_2 or A^3, 2 is called Subscript and 3 is called superscript. To write a subscript or superscript in a document, first click on the home menu of the page and then click on the font and finally click on subscript (X_2 or Superscript X^2. Then click ok and type 2 in the document. Then again go to font option in home menu and click on subscript or superscript command to unselect the option. Alternatively press Ctrl+ = for Subscript or Ctrl+Shift+ = for superscript on the keyboard to write subscript or superscript quickly.

- **Change Case:**

  Changing the words within a line to lowercase or uppercase is called change case. To do this, first select the word of the line or the total line and then select change case from the home tab. Change Case dialogue box will appear and click on change case in the dialogue box. You can also press Shift+F3 as a shortcut to change the case.

- **Changing of Font, Style and Size :**

  If you want to change font, font style or size of the font in a document, then first select the text and click on the font part of home tab then go to the font dialogue box option and select the desired font and click ok. The shortcut key to open the font dialogue box is Ctrl+D.

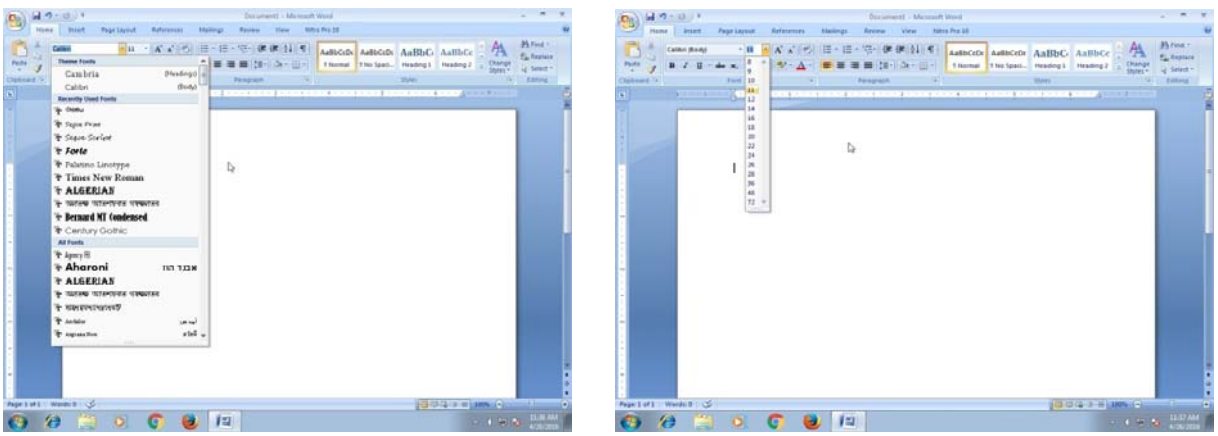


Fig. 3.6 Changing of Font, Style and Size

- **Spelling and Grammar:**

  Sometime the content of a document may contain misspelling or grammatical errors. MS word has options to find and fix such mistakes. In this case, if the spelling of the word is wrong a red dotted line can be seen under the word and if there is grammatical error, a green dotted line can be seen under it. For red underlined word if we right click on the word a window will open. In this window there will be many words similar to that spelling and user will click on the word that he/she likes

and that word will be inserted into the document. Many times it can be seen that read underline will appear under the words which are not available in the dictionary of the computer. In that case read underline will disappear on clicking the option ignore or ignore all.

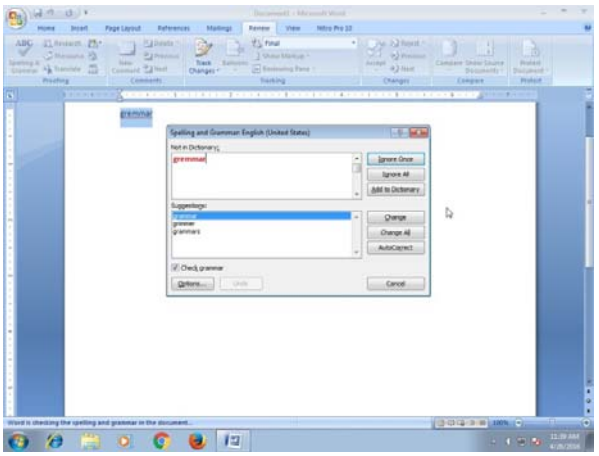


Fig. 3.7 Spelling and Grammar

- **Clip Art**:

  If it is needed to insert any image from clip art into a document, then follow the steps below -

  a. The document in which the image is to be inserted from clipart, must be open first.

  b. Place the mouse pointer at the place where the clip art is to be inserted.

  c. Click the clipart button in the illustration command group of the insert tab.

  d. The clipart task pane window will appear.

  e. Enter the required type of clipart or graphics in the search for option of the task pane and click on go all to find the required graphics.

  f. Next click on the desired picture or graphics, the clipart will be inserted in the specified place of the document.

- **Symbol :**

  Sometimes documents required special characters or symbol that are not normally available in the keyboard. MS word as facility to insert such symbols. These symbols can be inserted in the following ways. Place the cursor where the symbol needs to be placed in the document and click to insert. Then click the close button to close the window.

  Insert → Symbol → Select the symbol → Insert

- **Word Art:**

  Any word or text can be written in different styles with the help of insert word art option of the drawing tool. This task can be done as follows.

  a. Click on Word Art button from insert tab.

  b. Various styles of word art can be seen on the screen. Select the desired style.

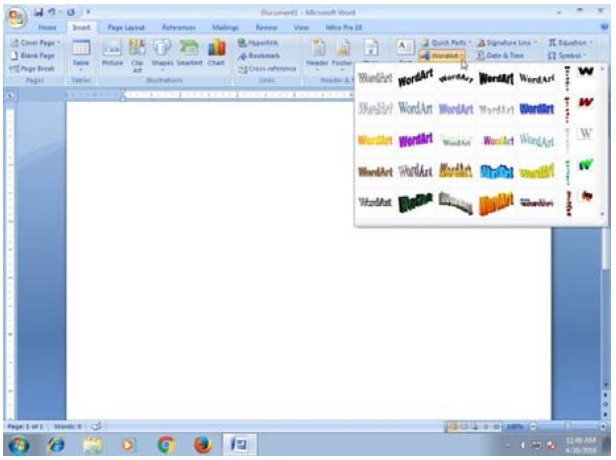


Fig. 3.8 Word Art

c. Text box of edit word art will appear on the screen.

d. Type the required text in the text box. Desired font and font size can also be selected from the text box.

e. If required change the text to bold or italic style.

f. Finally click on ok button.

- **Mail Merge :**

  If you want to send the same document or later to different addresses, write the content or body of the letter as main document and all the addresses as another document (called data source), Merge these two documents together with the help of merge option is called Mail Merge.

  The entire mail merge process is basically done in three stages, namely -

  a. Create main document

  b. Create data source

  c. Merging of main document with the data source.

  The following steps are to be followed to make the entire process very simple and orderly. This is to remember that the mail merge task should be open before the starting of mail merge and click the start mail merge button and also follow the step by step mail merge options.

- **Create/ set up main document:**

  a. Click on mailing ribbon and then click the start mail merge button from the start mail merge group. A least will appear from which the letter option is to be selected.

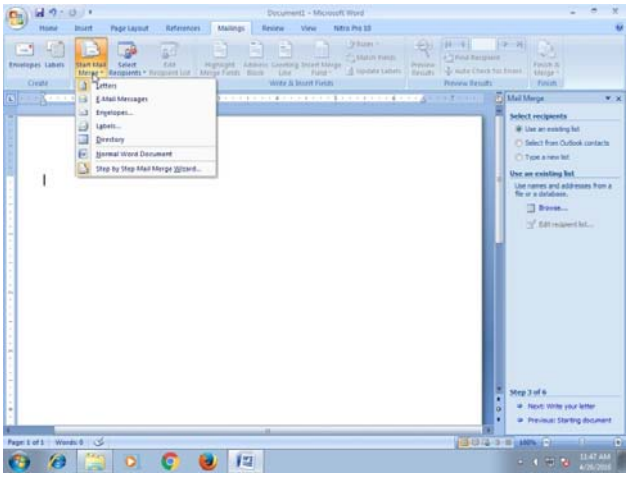


Fig. 3.9 Create/ set up main document

b. Then type the body of the letter. A sample is shown below -

To
Dear X,

Cordially invited to attend my birthday celebration party which is to be held on 20th August 2018 Tuesday in my own house.

I wish that you must come to my house in Salt Lake at 8:00 p.m. onwards.

Your loving friend
Y

- **Creating data source:**

Create data source the following process is to be followed:

a. Click on select recipes button and then also to click type a new list again.

b. New address list dialogue box will appear in this dialogue box, the field names like title first name, last name etc will be in separate columns. Looking on the customise columns button will display the customise. Address list dialogue box to remove the undesired fields while keeping the desired fields. Fields

c. To delete additional fields select these field and click on the delete button. To add a new field, click the add button in the customise address list dialogue box. An add field dialogue box will appear. Enter the name of the field and click on the ok button.

d. Then click ok button in the customise address list dialogue box.

e. The new address list dialogue box will appear. Hence the specified fields have to be filled with correct information. Once all the information of the first recipient is entered, click on the new entry button to enter the information of the next recipient. In this way after the entry of all records click on ok button.

f. Then the save address list dialogue box will appear. All recipient records typed here will be stored as a file. Now type the desired file name in the text box of this dialogue box and click the save button. Note that the .mdb extension will automatically appeneded to the data source file containing the recipient's address.

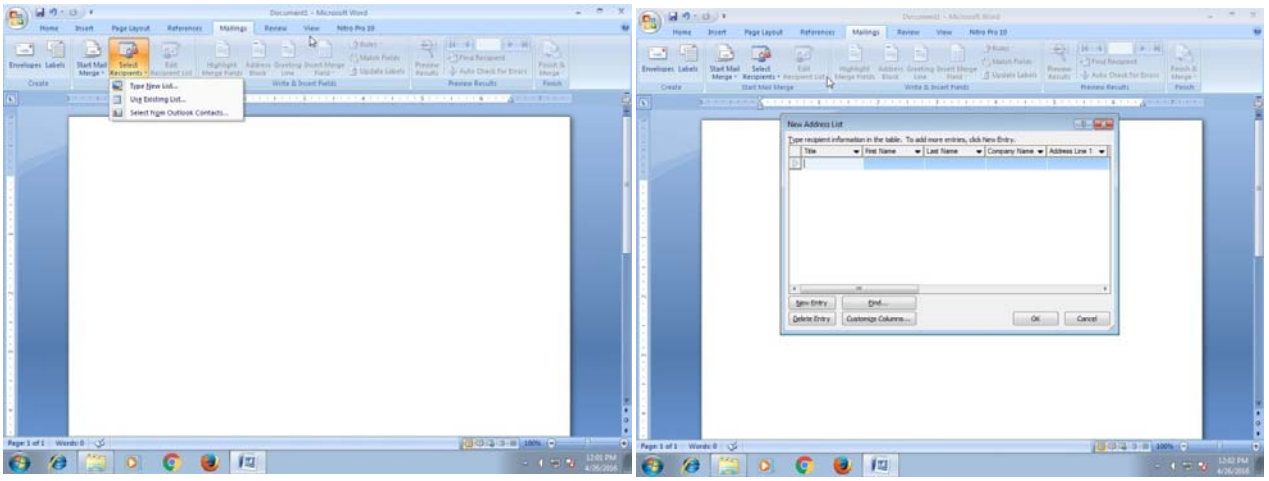


Fig. 3.10 Creating data source

- **Merging main document and data source:**

  At this stage, merging the data source with the main document will complete the mail merge process.

  a. First, open the main document then put the cursor under the text 'To' of main document and click on the insert merge field button to add various fields from the list (such as first name, address line 1 etc) to the main document.

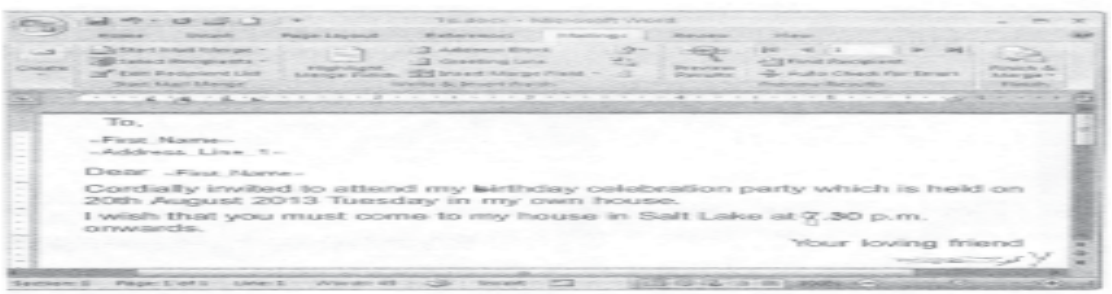


Fig 3.11 Mail Merge

  b. Then click on preview results button

  c. By clicking on the arrow symbol of the next record the records of each recipient can be seen.

  d. Then click on finish and merge button in the finish command group and click on print document in the list. Merge to print a dialogue box will be displayed. Click the Ok button in the dialogue box to print the document.

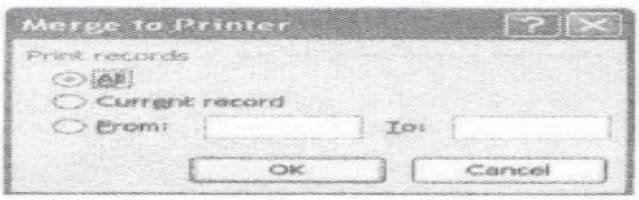


Fig. 3.12 Creating data source

3.5 Page Setup

The page layout option can be divided into several sections. For example, margins, vertical alignment, page and paragraph break, section break, page number, header and footer,paper size etc. These are highlighted below—

a) **Margins:** margins can be set up on that page by using the specific page from the page layout tab located within the page setup command group. The margin values of a document can also be changed according to users' needs from the page setup dialogue box. All the options that are available in the margin tab property sheet situated in the page setup dialogue box are top or top margin, bottom or bottom margin, left or left margin and right or right margin. Besides these Gutter is used to provide margin or extra space and its position is determined for book binding.

b) **Orientation:** Any page can be set in two different orientations such as portrait and landscape. Portrait is used for setting the page vertically and landscape is used for arranging the page horizontally.

c) **Multiple pages:** Multiple pages list box is available after orientation option in margin tab sheet by which some page setup property can be used in multiple pages according to the user's choice.

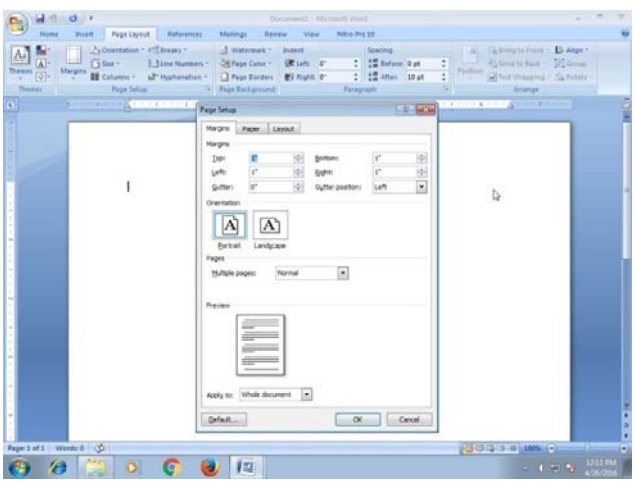


Fig. 3.13 Page setup

d) **paper size:** To change the size of a certain paper the typed text must be selected first. The options available after clicking on the paper tab property sheet in the page setup dialogue box are discussed below—

- **Paper size list** box : The size or shape of the paper is defined with the help of the paper size list box. For example A1, A2, A4, letter, legal,A3, A5 custom etc.

- **Width :** This section is used to determine how wide a particular page or paper will be.
- **Height:** This field is used to define the height of a particular page

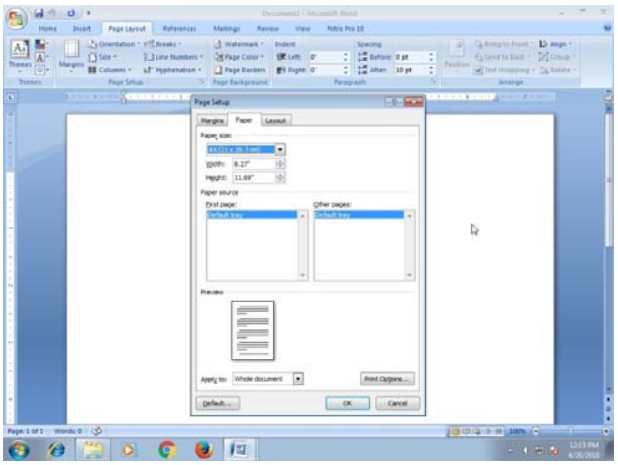


Fig. 3.14 Page setup

- **Paper source:** The paper source option is said by two different scroll boxes in the paper size tab property sheet located in the page setup dialogue box to print one or more pages. These two options are first page scroll box and other pages scroll box

e) **Page and Paragraph Break:** If you want to start a new page with a break after a paragraph specified by the user for his specific page, the page break located in the page command group of the insert tab is to be clicked on. The position from which the page break should be done, is the position where the user has to keep the cursor in the page,the page will be split into two and a new page will start from the part.

f) **Header and Footer :** Clicking on header button from header and footer command group in the insert tab, A header gallery list will be displayed. The header title of the file can be set by writing the title or header of the document file according to the users choice. Header and footer tool are called design tools. The footer area has the Buttom of a particular page is associated by the go to footer button located within that design tab. Also if you Mark the footer button from the header footer comment group gallery will open in which page number document file name, date etc. Can be set according to the users wishes. With the help of the header footer design tab, after completing the specified work of header footer, clicking on close button will close the header footer.

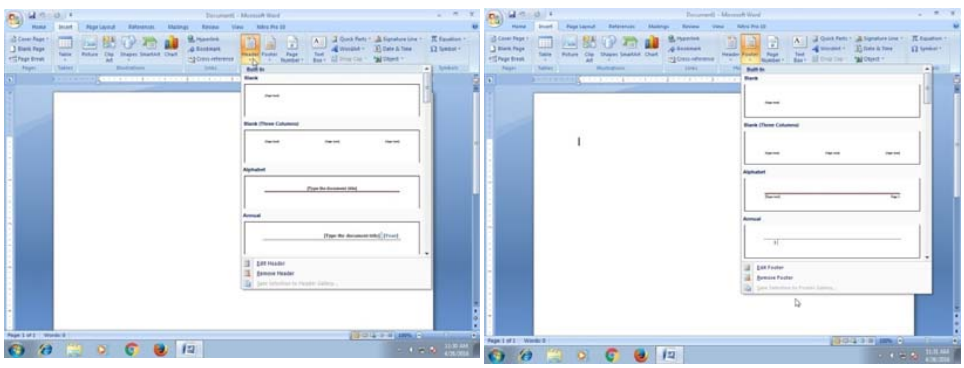


Fig. 3.15 Header and Footer

g) **Page number:** To assign page numbers to the pages of a document select header footer comment group from the insert tab and click on the page number option. Hindi substance the user can write the page number one the page margin. Also clicking the format page number from the drop down menu in the header footer comment. group of the design tab will display the page number format dialogue box any of the page number for maths from the number format scroll box and also select the page numbering start radio button. That from which the page number will start in the document and click ok button of multiple pages of the document namely 1-2-3...

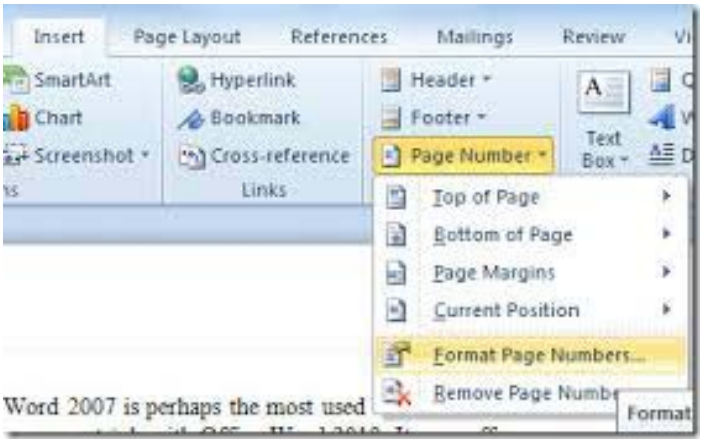


Fig. 3.16 Page number format box

h) **Section Break:** To create two or more columns or sections on a page, if any one of the column drop down boxes located in the page setup command group under the page layout Tab is marked according to the user's choice and ok, a text can be written or typed according to multiple columns on specific pages. Also column break option can be found by clicking on the insert page and section break rectangular box located at the top right of the page setup comment group on the page layout tab.

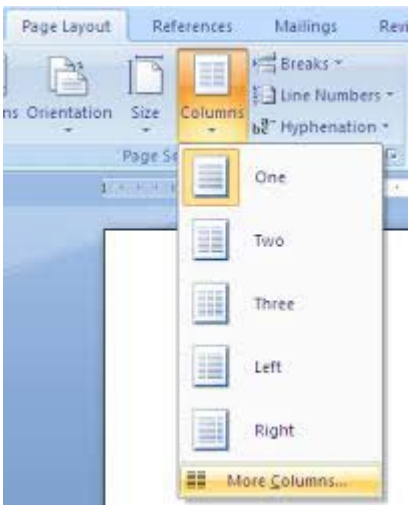


Fig. 3.17 Column Dialogue box

3.6 Inserting Table

If you need to insert a table in a document you can create a table from the table grid option located in the insert tab of the MS Word menu bar. Below are the method for greeting tables written the document.

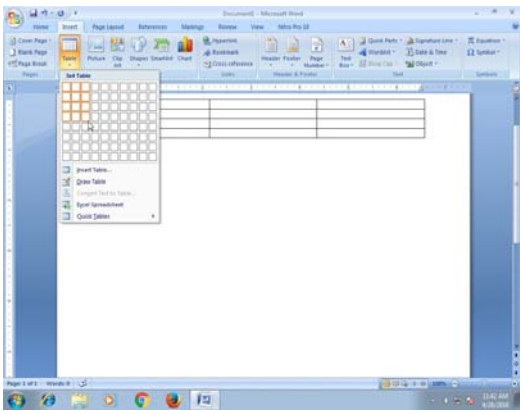


Fig. 3.18 Inserting Table

Creating table with the help of mouse:

Move the mouse pointer to the part of the document where the table is to be inserted and click. After clicking on the table group located in the insert tab, the table grid option will appear. From the option then row and column number of the specified table mark according to the users choice and neat, and click with the mouse with reach the specified parts of the table document.

Creating table with the table option:

Making an clicking the table option from the table group comment located in the insert tab will open the table dialogue box in which the number of rows and columns can be determined according to the requirement and after clicking the okay comment button, the table with the specified rolls and columns will come to the document file.

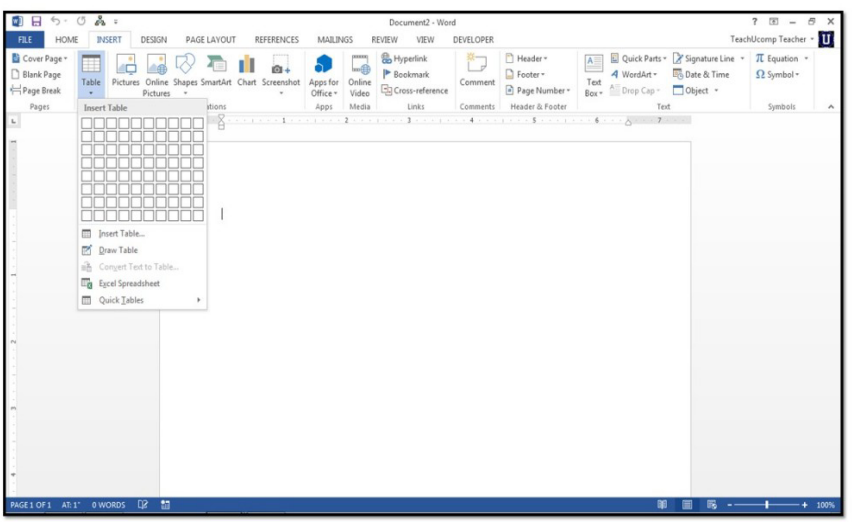


Fig. 3.19 Creating table with the table option

Marching and splitting is the process of combining multiple cells in a table first identify the sales to be March. By selecting the Marked sales and clicking the March option in the March sales comment group located in the layout contextual tab, multiple cells will be March into one cell. To divide a sale in a table into multiple parts, after identifying the specific sale in the table click the speed cell option of the March comment group located in the contextual tab, a dialogue box will appear in feet the number of parts that the subject cell will be divided into is determined. After clicking the okay button the cell will be divided according to the specified number.

3.7 Chart Preparation

It is possible to insert graphs or charts into a document as needed. The insert chart dialogue box will appear if you place the cursor in the part of the document file where the chart is to be inserted and click the chart option in the illustration command group located in the insert tab. In that dialogue box mark any chart located in the template as needed and click the ok command button to bring up the specific chart.

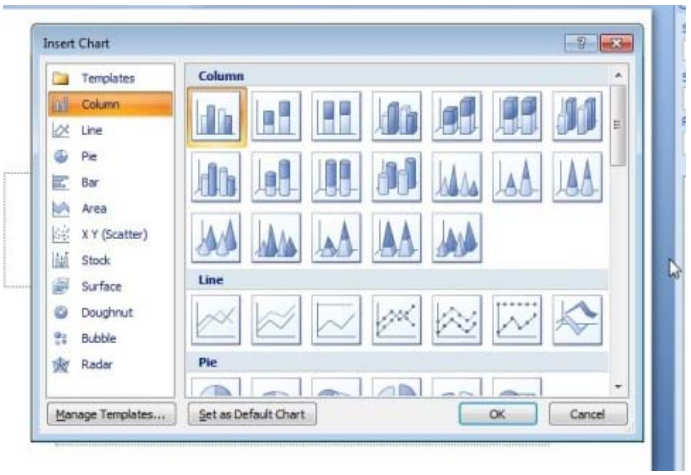


Fig. 3.20 Chart Preparation

It is also possible to create charts or graphs based on the data or information in a specific table in the document. To accomplish the task, the table located in the document must be selected first. The data sheet for the First row of the selected table should be labelled with the specified name as the X-axis (along the horizontal axis) and the left most column of that table should be labeled as the y axis (along the vertical axis). After selecting the specific chart or graph from the chart dialogue box and clicking the okay button, the chart or graph will move to a specific place in the document according to the data sheet of that table.

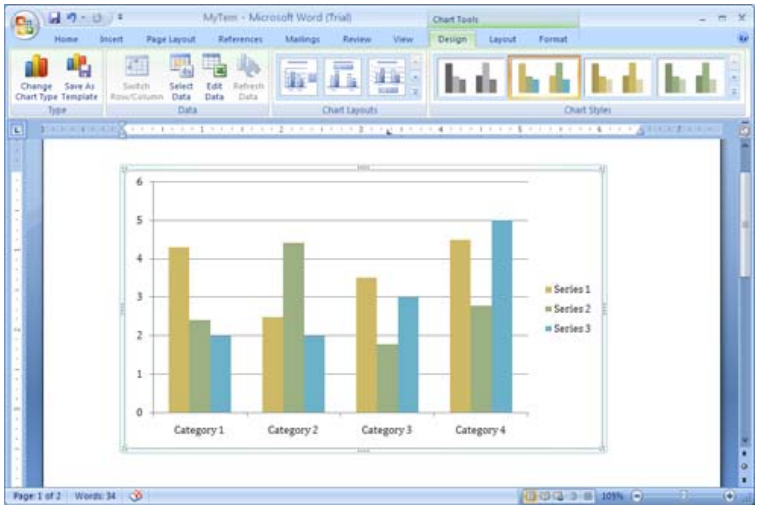


Fig. 3.21 Chart Preparation according to the data

3.8. Printing a Document

To print a word document, select the print option from the options available by clicking on the file button. In this case, the user can change the required options from the dialogue box that opens. For example - printer name, which pages to print or all pages to print etc. Finally if you click ok, the page or document will be printed. The shortcut key to print a document is Ctrl + p.

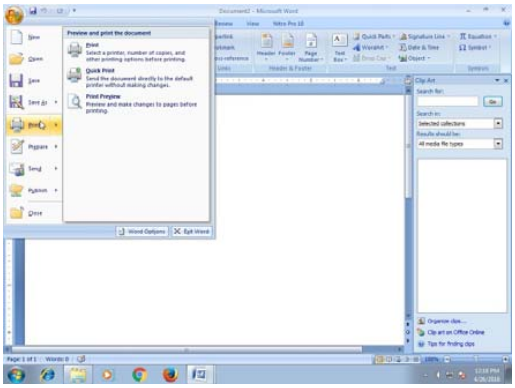


Fig. 3.22 Document Printing

Before printing, you can see how a document will look when printed through print preview. Shortcut key to view print preview of document is ctrl+ F2. Print can be possible from print preview also. To back from the print preview close button must be pressed.

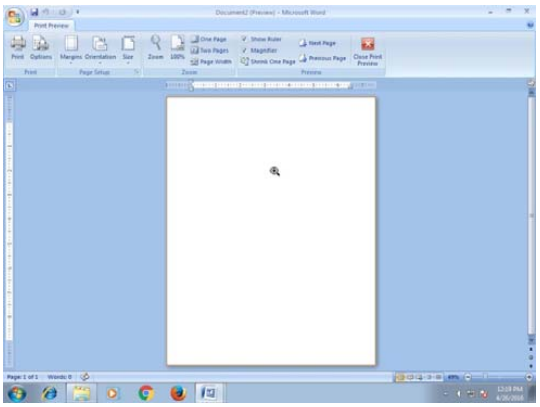


Fig. 3.23 Print preview

3.9 Some Essential Keyboard Shortcuts Used in MS Word

Shortcut key	Use
Home	To move the cursor at the beginning of the current line.
End.	To move the cursor at the end of the current line
Page up Page down	To move the cursor of a screen
Ctrl + home	To move the cursor or down a screen
Ctrl + end	To move at the very beginning of a document.
Ctrl + page up	Move to very end of a document
Ctrl + page down	To move at the first character of the current screen
Ctrl +	To move at the last character of the current screen
Ctrl +	To move one word to the right
Ctrl +	To move one word to the left
Ctrl +	To move at the beginning of previous paragraph
Ctrl + C	To move at the begning of next paragraph.
Ctrl + X	To Copy To Cut
Ctrl + V	To Paste
Ctrl + P	To Print

3.10 Summary

- Word processing is the process of expressing word in a comment and orderly manner through a computer.
- Important features of word processing are creating new document, saving copy editing etc.
- MS Word of Microsoft office is an important word processing tool.
- It is possible to add header and footer to the word document and use symbols, bullets numbers etc. as needed
- Word Art, subscript and superscript can be used to style the document content of various images can be inserted through Clipart.
- Mail merge method is used to send letters of some content to different addresses.

3.11 Unit End Exercise

1) How to open MS Word?
2) How a document is saved?
3) Describe how H2SO4 can be written?
4) Write how Clipart is used in a MS Word document?
5) What is header/footer? How to add header/ footer in MS Word?
6) Discuss how tables are created in MS Word with examples.
7) Write the steps on how to print a document?
8) Explain mail merge procedure in detail ?
9) Write the differences.
   i) Save & Save As.
   ii) Copy and cut.

Project work:

1) Write 10 sentence paragraphs about your organization and apply the following formatting to the paragraph like Bolt, Italic, underline, Centre alignment, different line spacing option and Indentation.
2) Create a table with five columns and 4 rows and feel it up with data.
3) Prepare D. El. Ed course certificate.
4) Prepare an application for the post of Para teachers in 5 different schools using mail merge.

UNIT 4

MS Excel

4.1 Introduction

A spreadsheet program is an application software, where data is arranged along rows and columns, mainly to perform various mathematical operations. An important case tool in the MS Office package is Microsoft Excel or MS-Excel which is a powerful spreadsheet software that can be used to perform various mathematical tasks quickly and easily. Also, with the help of Excel, data management, graph drawing etc. can be done efficiently.

A file created in Excel is called a workbook. A workbook contains multiple worksheets. Data can be inserted into MS Excel through a Work sheet and analyzed through various methods. Below are the steps to be followed to work in MS-Excel

- Click on Windows Start button.
- Select All Programs from the menu that will appear.
- Select Microsoft Office from the list of programs that will appear.
- A blank Excel work-book will open. Here the user can complete the task as per his requirement.

Start -> All Programs -> Microsoft Office -> Microsoft Office Excel

4.2 Objectives of the Unit

After reading of this unit learners will be able to:

1) Describe worksheet & workbook
2) Enter different types of data into Worksheet
3) Create different types of Graphs & Charts into Worksheet
4) Apply various formulas for numerical data processing

4.3 Worksheet

As soon as you open Ms Excel the Excel Workbook named Book1 is visible which contains three worksheets by default. New worksheets can be added as needed. A brief introduction to the various sections of the Workbook is given below.

Microsoft Office Button: The rounded Microsoft Office Button is available in the upper-left corner of the Excel 2007 Workbook window. On clicking this button, one can complete the various important tasks such as create a new file, open and close an old file, save a file, print a worksheet, send attachments by e-mail, exit from Excel, etc.

Quick Access Tool bar: This Tool bar is situated at very right next to the Microsoft Office Button and contains the icons of frequently used commands such as Save, Undo, Redo etc. Various tasks can be done very easily using these icons. While working in Ms Excel, the user can add and remove any tool from the Quick Access Toolbar according to his needs. Clicking on the Drop down Arrow of this Toolbar, the Customize Quick Access Toolbar will be visible.

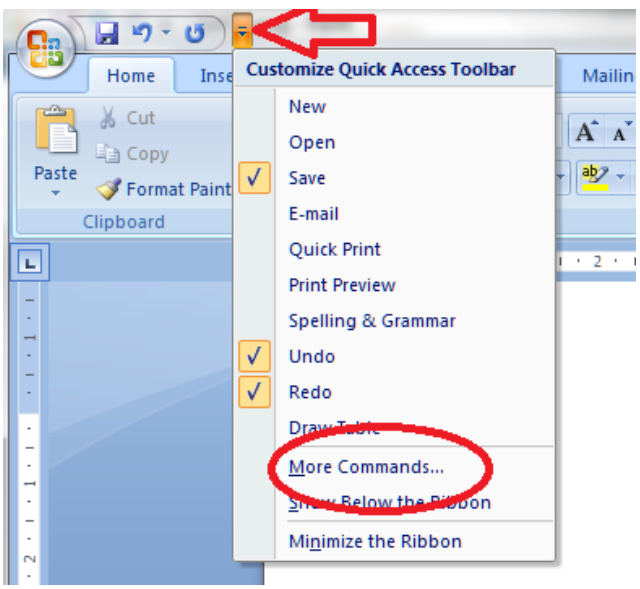


Fig. 4.1 Access Toolbar

If you click on the tool that will be added to the toolbar, a check mark [✓] will appear on the left side of the tool and the tool will appear in the Quick Access Toolbar. To exclude a tool from this Toolbar, click on the check mark [✓] next to that tool in Customize Quick Access Toolbar and the tool will not appear in Quick Access Toolbar.

Title Bar: This bar is located at the very top of the Excel window, and contains the name of the program along with the name of the file (workbook), e.g. "Microsoft Excel-Book1".

Ribbon: A notable addition to Excel 2007 is the Ribbon Tabs, located below the Quick Access Toolbar. By default, Home, Insert, Page Layout, Formulas, Data, Review and View are the seven ribbons. Each Ribbon contains several Command Groups, each of which contains an associated Command button. For example, the Command Groups located on the Home Ribbon tab are Clipboard, Font Alignment, Number, Styles, Cells, etc.

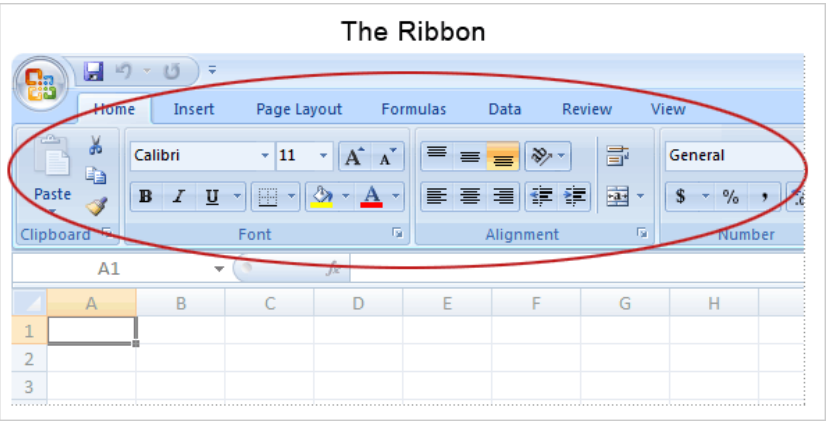


Fig. 4.2 Ribbon tabs

Worksheet: Worksheet is a Page of Workbook. An Excel file or workbook primarily consists of three worksheets. If necessary, the number of sheets can be increased or decreased. The bars that are visible horizontally in an Excel Worksheet are called Rows. Rows are numbered from top to bottom as 1,2,3,4... The total number of such Rows in a Worksheet is 1,048,576 The bars located vertically in the Worksheet are called Columns. Columns are named A, B, C, D,..... The total number of columns in the worksheet is 16,384. The intersection of a Row and a Column is known as a cell. Cells are named according to Column and Row names. For example, the name or address of the cell that will be created at the intersection of Row 10 and E Column will be E10. Clicking on a specific cell with the mouse pointer selects that cell. This cell is called Active Cell or Cell Pointer. Active Cell is covered by a thick line. At the bottom right corner of the Active Cell there is a small black box called the Fill Handle. The cell pointer within the worksheet can be moved up, down, right or left using the various arrow keys. Multiple worksheets can be added together in Excel and given different names instead of default names like Sheet 1, Sheet 2 etc.

Formula Bar: The white horizontal section below the Ribbon tab is the Formula Bar. In this part, a formula is usually written or data is typed to enter data in a cell. If data is written in a cell, it is seen at Formula Bar.

Name Box: Just to the left of the Formula Bar there is the Name Box. In this box, the address of a currently selected cell or a cell range is displayed.

Scroll Bar: Vertical and Horizontal Scroll Bar is used to move the Worksheet up or down and right or left respectively.

Sheet Tab: Click on this Tab to go from one Worksheet to another Worksheet. The sheet tab that is clicked on that sheet is active. If you click the right button of the mouse when a Worksheet is selected, you can insert a new sheet, delete a sheet, rename a sheet, copy or move a sheet from the edge menu.

Status Bar: This bar is located at the very bottom of the Excel window. The Status Bar displays r certain special keys, such as Caps Lock, Scroll Lock, etc. are whether on or off. If the Ready text is visible in this bar, it should be understood that the Cursor is located in the Worksheet Cell and in this state data can be written in the Worksheet.

4.3.1 Data Entry in Worksheet

Before discussing this topic it is necessary to know about what kind of data can be entered in Excel Worksheet. MS-Excel is able to identify the type of data being entered; Excel does not have to tell it the data type. In Excel Worksheet, generally four types of data entry can be done. These are discussed below.

Labels or Text: This type of data is descriptive information, based on the English alphabet, such as the name of a person or month or any sentence etc. The text data is consists of letters from A-Z, numbers from 0-9 or special characters like @, #, $, & etc. For example, “My name is Sachin” is treated as a label or text in Excel. “There are 4 numbers” is also a textual data. No mathematical operation can be done on such data.

Value or Number: This type of data is number. For example, 235 is treated as value in Excel, but “Number 235” is treated as label or text. In Excel comma or currency symbol may be used with large number. Mathematical operations can be easily done on this type of data.

Date and Time: Excel treats date and time as separate data types. For example: date can be written in Excel in various formats like 14-Mar 01 Mar 01. 03-14-01 etc. 1:30:55 PM, 13:30 1:30PM 13:30:55, 13:30:55 PM etc. are examples of Time data.

Boolean Value: This type of data is not used in the above cases, but Boolean Value is used in logical formula. To write something in a Excel cell, first select that cell. Then type with the help. of Key Board and press Enter. Then the cell pointer will move to the cell below the specified cell and the typed data will be entered in the specified cell. Alternatively, if you put the cursor in a cell and type the data in the Formula Bar, then the data automatically enter into the cell. After the data entry in the cell, Excel aligns the data according to the type of the data. But the user can change that alignment later. Excel aligns text data to the left of the cell, aligns the value or number to the right of the cell, and also aligns the date to the right of the cell. When entering a label or text in a cell, as soon as you type the first few characters, Excel fills the cell with a similar label (a label starting with those characters if already entered in the another cell). This feature of Excel is known as Auto complete for data entry. This feature of Excel makes it easy to type homogeneous labels. If the width of the value entered in a cell is greater than the width of the cell, then Excel fills the cell with several # symbols. To show the value or number properly, the width of that cell should be increased as necessary. Some data are numbers but are used as text. Like telephone number, pin code etc. If a number needs to be entered as text, then type a single quotation

mark (‘) at the beginning and then type the number. Excel treats any number typed in this way as text and aligns it to the left.

4.4 Data Editing

If any changes have to be made after entering data in a cell of Excel worksheet, then double click on the cell, the cursor will move to the cell and the data of the cell can be edited. Various processes of data editing in Excel are described below-

Data Formatting

Cell formatting is the method of decorating the text, numbers etc. entered into different cells of Excel Worksheet with Font, Size, and Color etc. Formatting of data can be done by clicking on dialog box launcher at the bottom right of the command group Font, Alignment, Number, etc. of Home Ribbon with the help of buttons and then using different options of Format Collective box. Again, if “Format Cells” option is clicked from the menu obtained by right clicking on a cell the “Format Cells” dialog box will appear. The “Format Cells” dialog box has different types of tabs, such as Number, Alignment, Font, Border, Fill and Protection. Data can be formatted by selecting various formatting options from these tabs.

Number tab: With the help of this tab, the type of data to be inserted in a cell is decided. Select the required data type (General, Number, Currency, Date Time etc.) from the Category List and then click OK.

Alignment Tab: After inserting data into a cell, the Alignment tab determines how it is arranged. horizontally or vertically in that cell. In this case, according to the need, the data can be kept in a cell at different angles. If the data entered in a cell is larger than the width of that cell, then part of the text goes to the next cell. But if you select the Wrap Text option of the Alignment tab, the text of that cell moves to the bottom of that cell instead of going to the next cell. As a result, the height of the cell increases slightly.

Font tab: Font name, Font style (Regular, Italic, Bold etc.), Font size, type of underline, text color, Effects etc. can be changed through various options under this tab.

Border tab: With the help of this tab, a border can be drawn as required, around any cell or selected cell group. Border style (single line, double line, dotted line etc.) and color of the border can also be determined with the help of this tab.

Fill tab: This tab is used to give a color or a special pattern to the inner side or background of a cell.

Protect Tab: One or more cells can be protected through the Protection tab. As a result, no data of those cells can be changed or deleted. To protect a cell, click on the Locked check box of the Protection tab. It is particularly noteworthy that before protecting any cell, the Worksheet must be protected through the Protect sheet button of the Review tab.

Copy and Paste of Information

Follow the steps below to copy and paste data in MS Excel.

- First select the cell or cells that need to be copied.
- Click the Copy button from the Clipboard command group on the Home tab or press Ctrl+C from the keyboard. A copy of the data of that cell or cell range will go to the Excel clipboard.
- Place the mouse pointer in the cell where the data is to be copied.
- Click the Paste button from the Clipboard Command Group or press Ctrl+V from the keyboard. Then the clip board data will be pasted in the selected cell.

Drag and Drop

Data can also be copied through Drag and Drop process in Excel. Follow the below procedure to complete this task

- First select the cell or cells that need to be copied.
- When you move the mouse pointer over the border of the selected cell or cells, the pointer changes to an arrow.
- Now holding the Ctrl key and dragging the border of the selected cell or cells, this information will be copied to another blank cell.

Cut and Copy of Information

The method of cutting and pasting data in MS-Excel is described below.

- If you cut the data of a cell, the data is deleted from that cell.
- Select the cell or cells that need to be cut and click the cut button of the clipboard command group of the Home tab of the Ribbon or press Ctrl+X on the keyboard.
- Keeping the mouse pointer in the cell where the data to be pasted, click the Paste button from the clipboard command group or press Ctrl+V keys on the keyboard, the data will be pasted in that cell.

4.5 Working with Workbook

The various operations that can be performed on a workbook in MS Excel are discussed in detail below.

(A) Creating New Workbook

When Ms Excel 2007 is opened, a blank workbook is displayed on the screen with named Book1 written in the title bar. One or more new workbooks can also be created while Excel is running, by following the steps below.

- Clicking on Office button and then clicking on New Command will show New Workbook dialog box on the screen.
- Click on Blank and recent button.
- Then clicking on Create button will create a new workbook.

(B) Saving the Workbook

After entering the necessary data in the worksheet, the following steps must be followed to save the data:

- Click on the Microsoft Office button and click on the Save or Save As option. The Save As dialog box will appear on the screen.
- Enter a logical name of the File in the File Name Box.
- Click on Save button.

Press Ctrl+S to save using keyboard. File name extension in Excel 2007 is .xlsx

(C) Opening a Workbook

To open an existing workbook, follow the steps below.

Click on Office button and then click on Open option or press two keys (Ctrl+O) from the keyboard.

- Select the location of the saved workbook by clicking on the arrow symbol of the look in text box from the open dialog box that appears on the screen.
- Select the specific workbook or file and click on the open button to open the file.

(D) Deleting Cell Information

To delete the data of a particular cell, follow the procedure below.

- To delete the data of one or more cells, select the cell or cells.
- Press the delete key on the keyboard. In this case the data of the selected cells will be deleted.

(E) Inserting New Row

In many cases while working with Worksheets it is necessary to insert a new row. In that case follow the procedure below to insert a new row into the worksheet.

- Select the row by clicking on the heading of the row above which the new row is to be inserted (if only one row is to be inserted). To insert multiple Rows, select the Rows above which we want to insert multiple rows.
- Click on the Insert Sheet Rows menu appears after clicking the Insert button in the Cells. Command group of the Ribbon's Home tab a new Row will be added every time you click on it.

(F) Inserting New **Column**

To insert a new column in a Worksheet, the following procedure is to be followed.

- To insert a single column, select the column on clicking on the heading of that column, left of which the new column is to be inserted. If you want to insert multiple columns, select the columns, left of which the new columns are to be inserted
- A new column will be created every time you select Insert Sheet Column by clicking the Insert button in the cells command group of the Home tab.

(G) Deleting Cell, Row or Column

To delete Cell, Row or Column from any Worksheet, the procedure is described below.

- First select Cell, Row or Column which needs to be deleted.

- To delete the selected cell, Home tab -> Cells -> Delete -> Delete Cells these steps to be followed.
- To delete selected Rows, Home tab -> Cells -> Delete -> Delete Sheet Rows - these steps to be followed.
- To delete the selected columns, follow these steps: Home tab -> Cells -> Delete -> Delete Sheet Column.

(H) Resizing Row and Column

If you bring the mouse pointer to the border of two Row or two Column headers, when it takes resizing shape, the Row or Column can be easily resized by clicking and dragging the mouse. Besides, when the mouse pointer is brought at the boarder of two Row or two Column labels, the mouse pointer takes the resizing shape, and then if you double click the mouse, the Row or Column will automatically be resized according to the data of the Cell.

Alternative methods of Row Resize are discussed below.

- Select the entire row by clicking on the header of the row whose height is to be increased.
- Click the Format button in the Cells Command Group of the Home tab and click Row Height, the row height dialog box will be visible.
- Enter the required number in this box and click on the ok button to change the row height.

Column Resize options are shown below.

- Click on the column header to select the entire column.
- Clicking the Format button in the Cells Command Group of the Home tab and clicking column width will display the column width dialog box.
- Enter the required column width in this box and click on the ok button to change the column width.

(J) Auto Fill

With the help of auto fill method, the same type of data, sequential data, formula etc. can be inserted continuously in a specific column or row of the worksheet. The example below shows how to auto fill using the Fill Handle.

Example: Name of the seven days of the week (Sunday - Saturday) Auto fill method:

i) Sunday should be typed in any cell of the Worksheet.

ii) By selecting the cell written Sunday, bringing the mouse pointer on Fill Handle, the Mouse Pointer will turn into '+' sign.

iii) Press the left button of the mouse and drag downwards and stop dragging after "Saturday" text appears. As a result, the names of the seven days of the week from Sunday to Saturday will be inserted into the cells.

Example: Method to fill cells with numbers from 1 to 10 or more consecutively.

(i) First type 1 in a cell and 2 in the cell immediately below it.

(ii) Then select cells 1 and 2 together.

(iii) Holding down the Fill Handle of the cell 2 with the left mouse button, drag it to the cells. below.

(iv) The consecutive numbers 3,4,5,6 ..... will be visible and the mouse button should be released after the text 10 is displayed.

4.6 Data Handling

Data handling issues such as data fill, data sorting, data filter etc. can be done very easily in MS Excel. These operations can be done using the Data menu in MS-Excel. How to do data sorting is explained below.

Data Sorting

The method of arranging the data (text and number) in order of value, written in Column **or** Row in a Worksheet is called Data Sorting. Arranging the numbers in the same column or row from smallest to largest and the text according to A -> Z is called ascending order. Similarly, arranging numbers from largest to smallest and text according to Z -> A is called descending order.

Sorting on a Column or Row

(i) Select the cells that belong to the Column or Row that need to sort the data.

(ii) By clicking on the Sort & Filter button in the Editing Command Group of the Home tab of the Ribbon and clicking on Sort A to Z from the menu, the cell data will be arranged in Ascending Order. Similarly clicking on Z. to A option will arrange the data in Descending Order.

Sorting on multiple columns

(i) Select the Column or Row data to be sorted.

(ii) Click on the Sort & Filter button in the Editing Command Group of the Home tab of the Ribbon and click on Custom Sort from the menu obtained. The Sort dialog box will appear on the screen.

(iii) Select the first column for sorting from the drop down list of the Sort by text box of the Sort dialog box. Select A to Z or Z. to A from the drop down list below Order to sort in Ascending or Descending Order.

(iv) Then click on Add Level button of Sort dialog box. Here you have to select the second column from the drop down list of the Then by box and the third column by clicking the Add level button again if necessary. In each case A to Z or Z to A should be selected for sorting order.

(v) Finally clicking on ok button will complete the sorting.

4.7. Uses of Chart and Graph in Excel Sheet

The method of displaying different data in Excel Worksheet is called chart or graph. Data entry in Excel Sheet

Charts or graphs can be easily created on the sheet using Pie, Bar, Column Line, Area etc. are different in Excel Sheet

Types of charts can be created. Chart Option provides different types of charts with images. Here it is up to the user to decide

Choose any type of chart that will be reasonable with your data. The special advantage of charts created in Excel is the worksheet data

There is no need to create a new chart if there is any change. Data changes are automatically reflected in the chart. The various parts of the chart are discussed in detail below.

Data Series (Data Series) - The numbers that are spread over the rows or columns of the Excel worksheet are plotted on the chart. Those numbers together are called data series.

X **axis (X-axis)** - The horizontal line along which different categories (names of different columns) are expressed in a chart is called X-axis.

Y-axis (Y-axis) - The vertical line along which a data value is expressed in a chart is called the Y- axis. Legend (Legend) - A legend is a number of symbols used to identify the purpose of a data series chart and to interpret each type of data separately.

Gridlines - Charts have some horizontal and some vertical lines known as grid lines. The role of gridlines is very important in determining the value of any data from X-axis or Y-axis.

Chart Area - The box around the chart in which the chart is located is called the chart area.

Chart Title - Every chart has a title that identifies the chart.

Plot Area - The part inside the chart area where the main chart is located is called the plot area. From Plot Area, The value of the data is known.

4.7.1 Preparing Chart

There are several ways to create charts or graphs in Excel 2007. The methods of making Column Chart, Line Chart and Pie Chart are discussed here.

Preparing Column Chart

- Select the data range from the Worksheet to create the Column Chart based on the data range.
- Click on the column button in the Charts Command group of the Insert tab of the Ribbon. A list with images of various column charts can be seen, such as 2D, 3D column cylinder, cone, pyramid etc. From there, click on the desired layout.
- The Column Chart based on the selected data range can be seen in the Worksheet. The method of inserting the column church is shown in the diagram below.

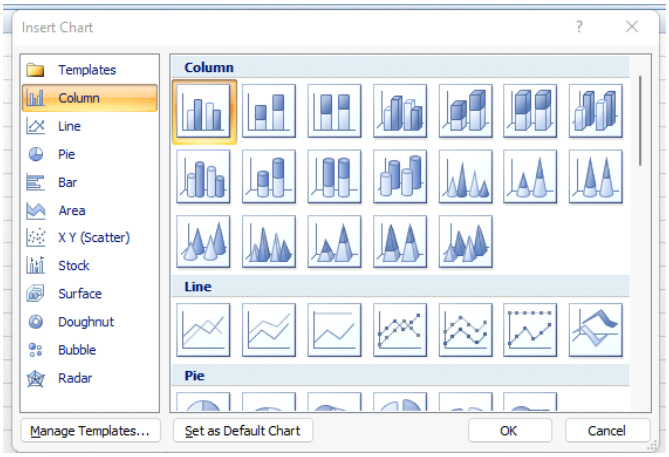


Fig. 4.3 Column chart

Preparing Line Chart

- To create a Line Chart, the required data lines must be selected from the Worksheet.
- After clicking on the Line button in the Charts Command group of the Insert tab, a list of different types of Line Charts will be displayed. For example, 2D Line includes Line, Stacked Line, 100% Stacked Line, Line with Markers and 3D Line etc. One has to click on the specific layout from among them.
- The Line Chart based on the selected data will be displayed in the Worksheet.

Preparing Pie Chart

- Select the data range from the Worksheet on the basis of which the Pie Chart has to be created.
- After clicking on the Pie button of the Charts Command Group of the Insert tab of the Ribbon, the layout of various Pie Charts will be displayed like Pie of 2D Pie, Exploded Pie, Pie of Pie and 3D Pie of Pie in 3D, Exploded Pie in 3D, etc. Click on the desired Pie layout.
- The Pie Chart created from the selected data can be seen in the Worksheet.

  Below figure shows how to make Pie chart.

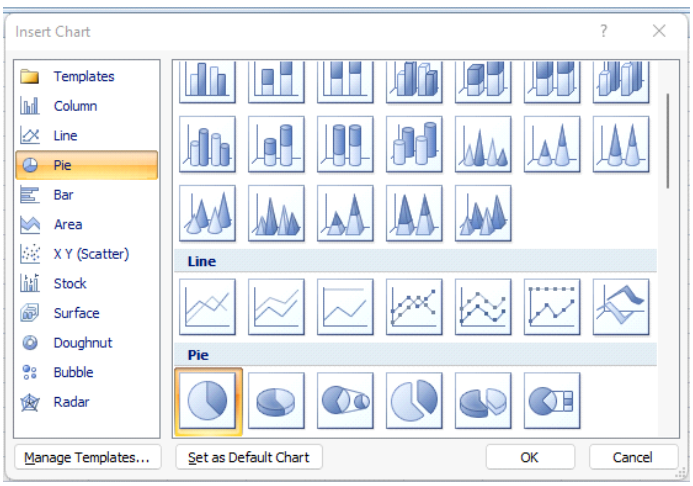


Fig. 4.4 Pie chart

After creating a chart or graph in the Worksheet, the various changes regarding to Chart Design, Layout and Format can be done with the help of three additional Tabs e.g. Design, Layout and Format of the Ribbon. These Ribbon tabs are discussed below.

Design Tab

This tab contains five command groups named Type, Data, Chart, Layouts, Chart Style, and Location. With the help of the buttons present in this command groups one can Change the type of a chart, data selection, change the layout of the chart, change the style of the chart and change the location of the chart (moving the chart from one sheet to another sheet).

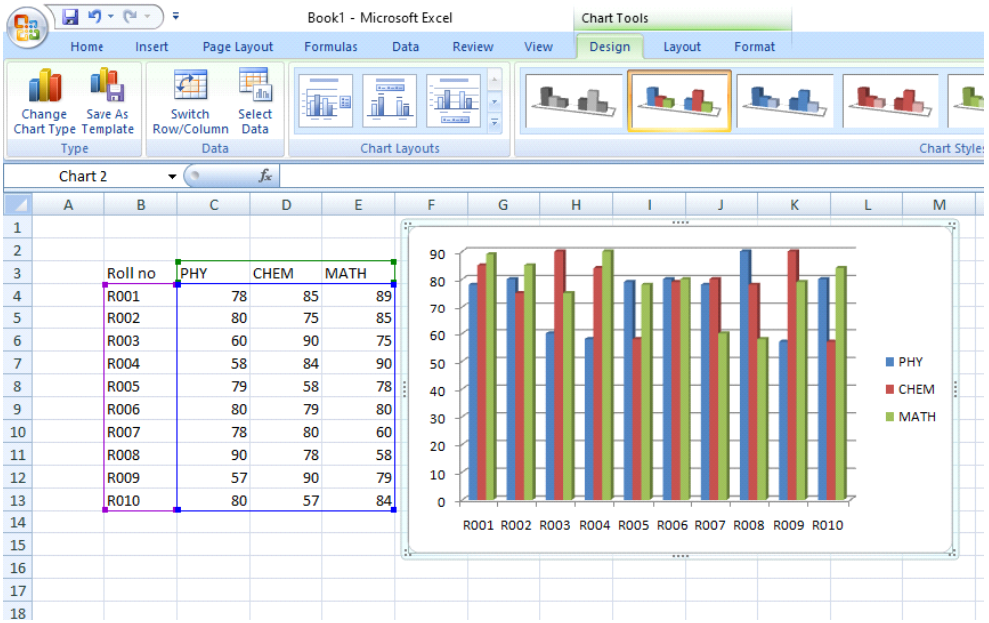


Fig. 4.5 Design tab

Layout tab

Command groups on this Ribbon tab are current selection, Insert, Labels, Axes, Background, Analysis and Properties. With the help of these buttons in the Command group, you can select various parts of the chart, such as Chart Area, Chart Title Legend, Plot Area, etc. can be done

Format Tab

This ribbon tab has five command groups Current Selection, Shape Styles, Word Art, Arrange, and Size. With the help of these buttons different parts of Chart like Chart Area, Chart Title. Plot Area, Legend etc. can be given various colors, line color, shadow effects, chart shape style. changed etc.

4.8 Printing Worksheet

Before printing a worksheet, the page should be properly arranged (e.g. Page-Size, Margin, Orientation, Header, Footer etc.). Clicking on page setup from Page Layout tab will open the Page Setup dialog box. The various tabs of this Page setup dialog box are discussed below.

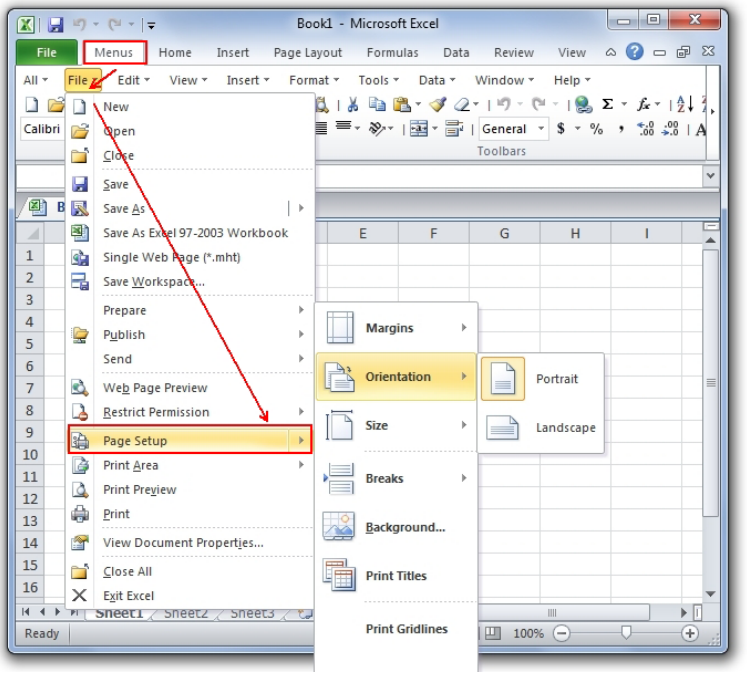


Fig. 4.6 Page Setup

Page Tab

- Select how the page will be printed from the Orientation area, such as Portrait or Landscape.
- Select the required paper size (e.g. A4, A3, Legal etc.) from the Paper size drop down list.
- Select the correct resolution (dots per inch) from the Print Quality drop down list.
- If you want to start from a number other than Page 1 then type the page number in the First Page number box.

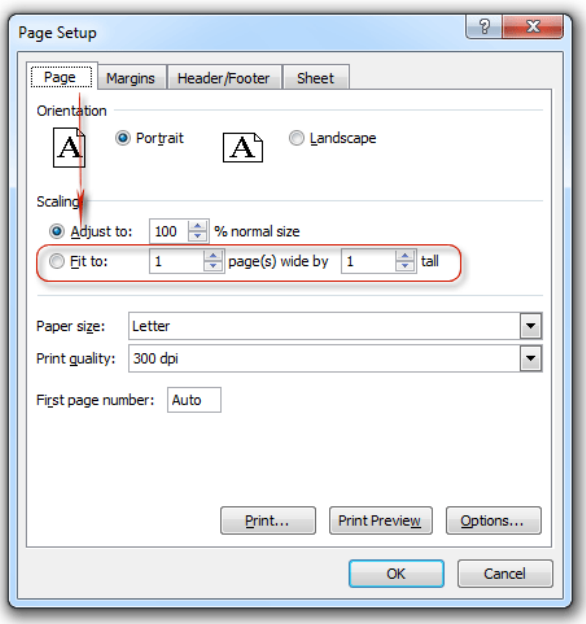


Fig. 4.7 Page tab

Margins Tab

Clicking on the Margins tab of the Page setup dialog box will open this tab.

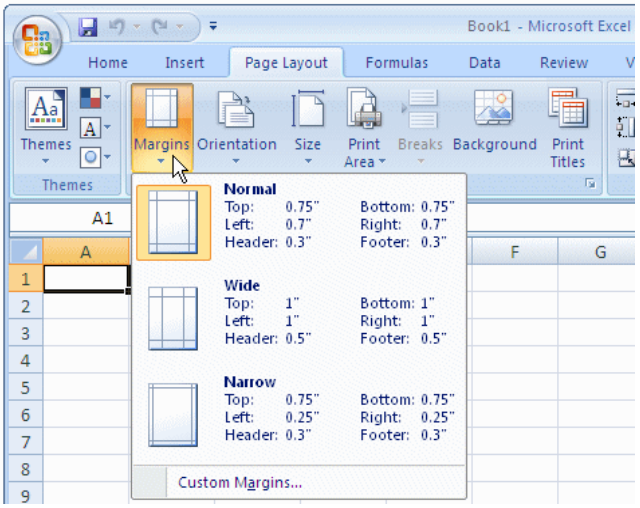


Fig. 4.8 Margins tab

From the Top, Bottom, Left, Right box, specify how much margin should be set at the top, bottom, left and right of the page respectively.

Header/Footer Tab

To set the Header and Footer of a page, click on the Header Footer Tab.

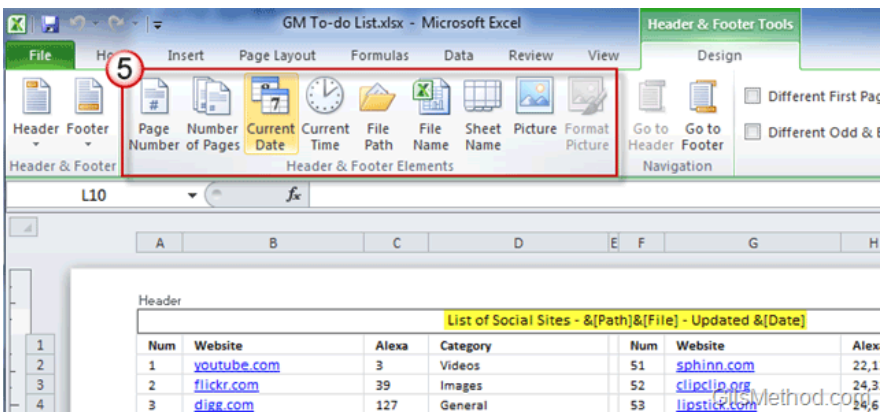


Fig. 4.9 Header/Footer tab

To create a new Header or Footer as per your choice, click on the Custom Header or Custom Footer button respectively. In that case, a new dialog box will appear where the necessary text entry has to be done. Here the text can be formatted and page number, total number of page, date, time etc. can be inserted in Header or Footer.

Sheet Tab

The options on this tab are discussed below.

Print Area : By clicking this box, how much part of a worksheet will be printed is specified.

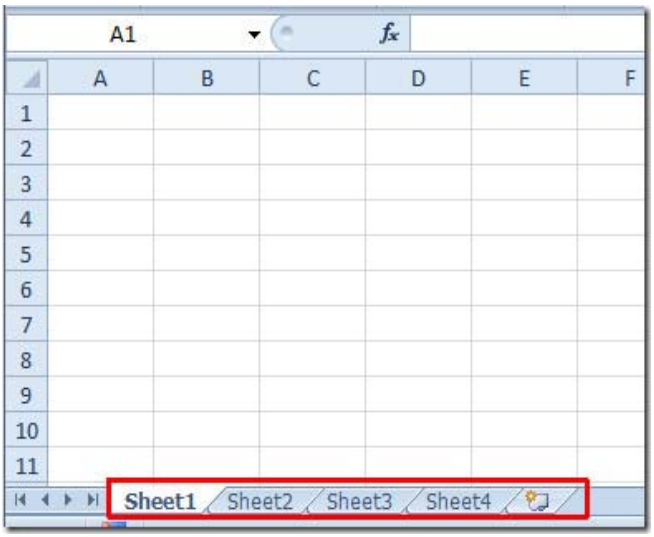


Fig. 4.10 Sheet tab

Rows to repeat at top: By clicking on this box, which rows will be printed on each page is selected.

Columns to repeat at left: By clicking on this box, which columns will be printed on the left side of each page is selected.

Gridlines: Selecting this box will print gridlines on every page.

Print Preview

When the Page Setup is finished, how the worksheet will look after printing can be seen through the print preview. To view the print preview, click the Print Preview button in the Page Setup dialog box or select Print Preview by clicking the Microsoft Office Button or press Ctrl+F2 from the keyboard.

Print

To print a worksheet, click on the Microsoft Office Button and select Print or press Ctrl+P from the keyboard. Then the Print dialog box will open. The options in the Print dialog box are discussed below

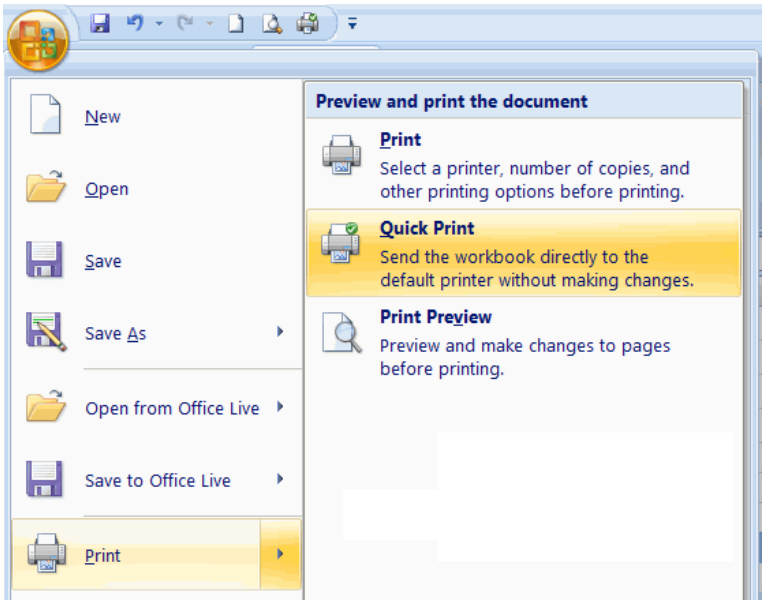


Fig. 4.11 Christ dialog box

Name: Select the name of the printer to be printed from this box.

Print Range: It is decided which pages will be printed from this option.

Print What From this box it is decided what to print. To print the selected part select the option Selection, to print active Sheets select the option Active Sheets and to print entire workbook select the option Entire Workbook.

4.9 Use of Formula in Ms Excel

One of the most essential uses of Ms-Excel is to perform calculations using various mathematical formulas. A formula establishes a relationship between two or more cells in a worksheet. The method of calculation using the formula is discussed below.

Inserting Formula in Cell

To insert a formula in a cell, follow the steps below.

(i) Select the cell by clicking on the cell in which the formula is to be inserted.

(ii) Type the symbol '='.

(iii) Then the formula should be entered after the symbol '='.

(iv) Finally press Enter key.

Instead of typing a formula directly into a cell, a formula can be typed in the formula bar. Once the formula is typed, pressing the enter key will display the result of the formula in the selected cell. The method of insertion and copying of formula is shown using the diagram below.

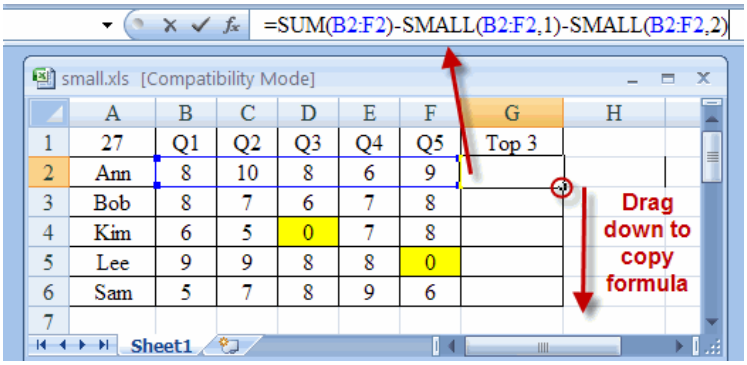


Fig. 4.12 Inserting the formula

An example of how to perform a specific function using formulas in MS-Excel is discussed below

Example: To determine the Average of the numbers in cells Al to AS.

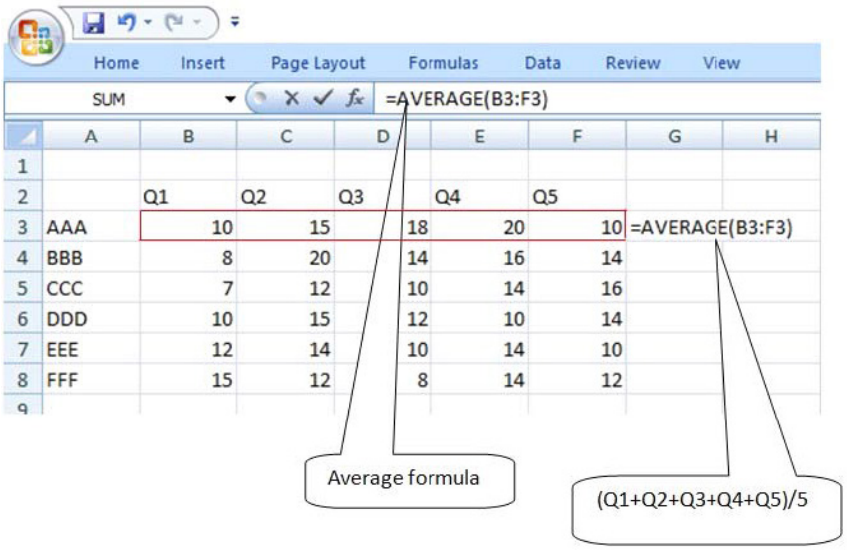


Fig. 4.13 Determining the mean of numbers

To complete the above task follow the below procedure.

(i) Cell A6 can be selected to display the result.

(ii) "= Average (A1:A5)" should be typed.

(iii) Enter key should be pressed.

Cell A6 will display the average of the numbers.

4.10 Functions of MS Excel

To know about all the functions that are available in MS-Excel, first select the Formula tab. Then click on the Insert Function button, then the dialog box of Insert Function will be displayed.

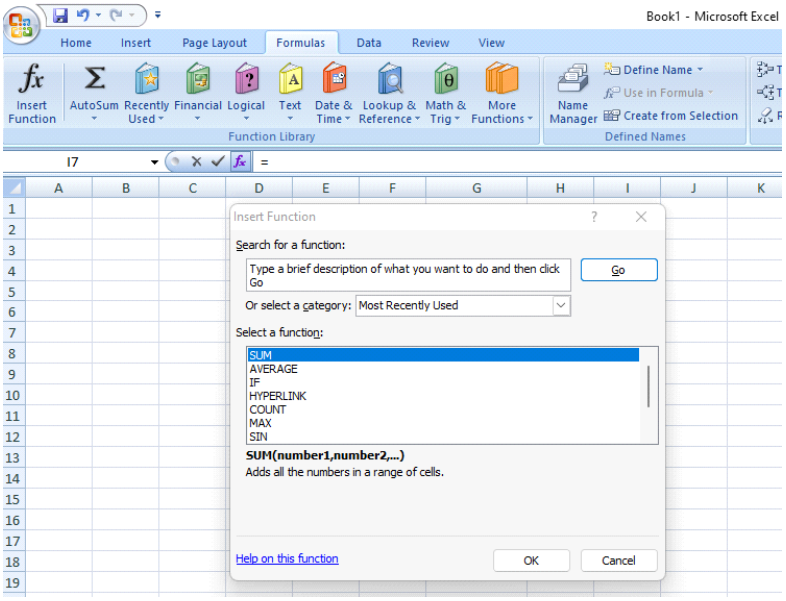


Fig. 4.14 Excel functions

Excel functions can be found and used according to category in this box. Excel has many types of Mathematical and Statistical functions. Some of these important functions are described below.

Abs **(Number)** - This function returns the Absolute Positive Value of the number used as a parameter.

Example: Abs(20) returns 20
Abs(-20) returns 20

Int (Number) - This function returns the nearest integer & rounds up the number used as parameter.

Example: Int (5.3) returns 5
Int (6.8) returns 7

Mod (**Number, divisor)** - This function returns the remainder after dividing the number by the divisor.

Example: Mod(89, 10) returns 9

Sqrt (**Number)** - This function calculates the square root of the number used as argument.

Example: Sqrt (25) returns S

Sum (Number 1, Number 2....) - This function returns the sum of the numbers.

Example: Sum (20, 30, 50) returns 100

Average (Number 1, Number 2) - This function calculates the average of the numbers.

Example: Average(10, 20, 30) returns 20

Max (Number 1, Number 2....) - This function returns the largest number among the numbers.

Example: Max(50, 120,70) returns 120

Min (Number 1, **Number 2....)** - This function returns the smallest number among the numbers.

Example: Min (50, 120,70) returns 50

Use of Autosum:

Autosum button is very useful to calculate the sum of several numbers very easily and quickly.

(i) First click on the cell in which sum is to be calculated.

(ii) Click on Auto Sum button from Home Tab.

(iii) Select the cells whose sum is to be calculated.

(iv) If you click on Auto Sum button again, the sum will be displayed immediately.

4.11 Summary

- This chapter discusses a widely used spreadsheet package called MS-Excel.
- MS-Excel is an important tool of MS Office with the help of which any mathematical calculation work, preparation of chart etc. can be done very easily and quickly.
- An Excel File is called a Workbook which consists of multiple Worksheets. An Excel File extension is .xlsx. The portion of the worksheet that appears on the screen is much larger than the actual worksheet. A worksheet consists of many Rows and Columns. The junction of a row and a column is called a cell. Data entry is done in this cell. Cells are named according to column and row names. If you type any information in a cell and press Enter, that information is stored in the cell.
- The width of Row & Column in Excel Worksheet can be changed with the mouse. Here although the Copy and Paste method is similar to MS Word but there are slight differences.
- Charts, graphs etc. can be created beautifully in Excel Worksheet. This chart or graph can be edited and copied and pasted into another file.
- Another important use of Excel is to solve long and complex problems using various mathematical and astrological formulas. Besides, Excel can be used to prepare various mathematical formulas.

4.12 Unit End Exercise

(1) What is meant by MS-Excel? Where MS Excel can be used?

(2) Discuss the method of adding information in a worksheet.

(3) Discuss with example how to draw a Pie Chart in MS-Excel.

(4) What is Auto complete in Excel?

(5) Discuss the functions of Formula Bar.

(6) How the content of a Cell in Excel can be deleted?

(7) Discuss in detail any four of the functions that can be used in Excel.

(8) What does Spreadsheet mean?

(9) Write the total numbers of Row and Column in an Excel worksheet.

(10) What is the function of Name Box?

(11) What does C37 mean?

(12) How to copy by Drag and Drop method

(13) How to add new Column in a Worksheet?

(14) How to insert a new Row in a Worksheet?

(15) What do you mean by Chart?

(16) Discuss the different parts of an Excel Chart.

(17) Describe the procedure to draw a Column Chart.

(18) How to print an Excel worksheet?

(19) What is Autosum?

(20) Explain how to find the mean of numbers using the formula.

Project Work

(1) Do the work as directed.

(a) Write three separate words In cells A1, A2 and A3.

(b) Write three numbers in cells B1, B2 and B3.

(c) Calculate the sum of the above numbers using Autosium by clicking on the B4 cell.

(d) Change the width & height of Column and Row respectively.

(2) Create the tabulation sheet below with the help of suitable Excel function.

Roll	**Name**	Marks							Total	% of Marks	Grade	Rank
		Language 1	Language 2	Math	Science	History	Geography	EVS				
1												
2												
...												
10												

N.B. : Total = Language 1+Language 2+ Math+Science+History +Geography +EVS

% of Marks = Total/7

Grade = A (% of Marks >=90)

= B (% of Marks >= 70 but<90)

= C(% of Marks 50 but <70)

= D (% of Marks 40 but <50)

= E (% of Marks <40)

(3) Construct a bar chart using the data in the above table.

UNIT 5

Using Power Point in Teaching Learning Process

5.1 Introduction

Power Point is one of the most essential application software of Microsoft Office. PowerPoint is very useful for presenting a topic beautifully. For this reason it is also called presentation software. In this software, the content can be presented attractively to the audience using the necessary images, graphs, charts, sounds, motion, colors etc. An important aspect of PowerPoint is that content can be presented at any level. From pre-primary level to university level and even at research level, the use of PowerPoint has played an equally effective role. Advantages of using PowerPoint are-

- Presentations made by Power Point can be displayed on different mediums; for example, computer screen, projector, LCD or LED, TV, Digital Screen etc.
- It is possible to print slides used in presentations made using PowerPoint.
- Power Point presentations can be easily modified or updated.
- It is possible to add audio and video clips directly to PowerPoint presentation slides.

5.2 Objectives of the Unit

After reading of this unit learners will be able to-

- Make a presentation using Power Point.
- Use various wizards in PowerPoint.

- Add images, graphs, designs, etc. to PowerPoint.
- Add sound, animation to slides.
- Print slides.
- Prepare lesson plans through PowerPoint.

5.3 Basic Concepts of Power Point

MS-Power Point is one of the most essential parts of MS Office package. A PowerPoint file is called as presentation. Just as a file can have many pages, a PowerPoint presentation can have many slides. Also-handouts, speaker notes, outlines, etc. can be in the presentation. Video Slide show, Web presentation is also possible through power point. Power point presentation is discussed in detail below.

5.3.1 Presentation through Power Point

To represent a PowerPoint presentation, it is usually made up of one or more slides. To open Power Point, first click from Desktop to Start → All programs → Microsoft office → Microsoft Power Point, then Power Point will open. Below is an image of the Power Point window. Presentations can be made with PowerPoint in two different ways. The first is with the help of Design template and second is using Blank Presentation. These are discussed below.

Creating a new presentation with the help of a design template:

To make a presentation in this way, you must first click on the Power Point office button. Then click on New Option, the New Presentation dialog box will open. After clicking on Installed Template Option, you will see the image below. There, if the user selects the Template according to his/her need and clicks on the Create Button, that template will be opened. In this case, the project will have many slides and the user can edit them as he likes.

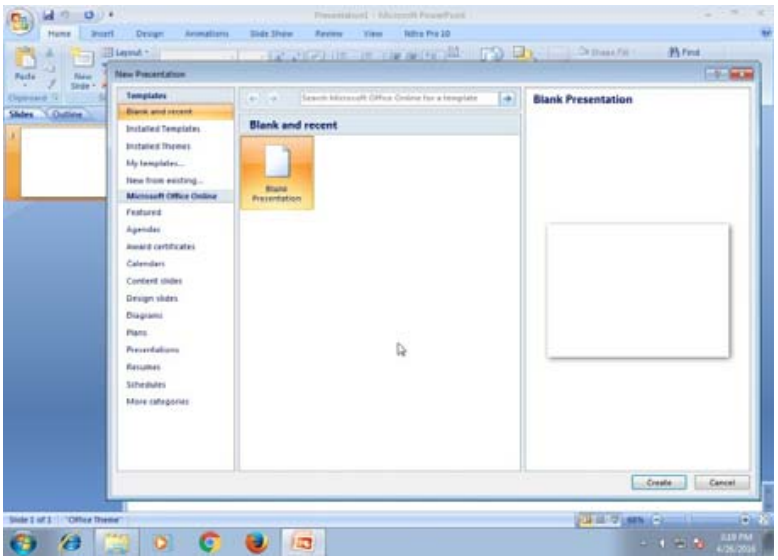


Fig. 5.1 PowerPoint window

Creating new representations with Blank Presentations:

In this way, if you click on the office button of Power Point and then click New option, a New Presentation will open. On clicking Blank and Recent Option there, Blank Presentation option will be available. After selecting the Blank Presentation Option and clicking on the Create Button, a Blank Presentation will be created and this window screen is completely blank. User can create new presentation using the design of his/her choice.

The various ribbon tabs in Microsoft PowerPoint 2007 are Home Ribbon tab, Insert Ribbon. tab, Design Ribbon tab, Animation Ribbon tab, Transition Ribbon tab, and Slide Show Ribbon tab. These are highlighted below.

Home Ribbon Tab: This ribbon tab is formed by the commands such as Cut, Copy, Paste, Font Size, Bold, Italic, Underline etc.. The Clipboard, Slide, Font, Paragraph, Drawing, and Editing command groups etc. also belong to this Home Ribbon tab.

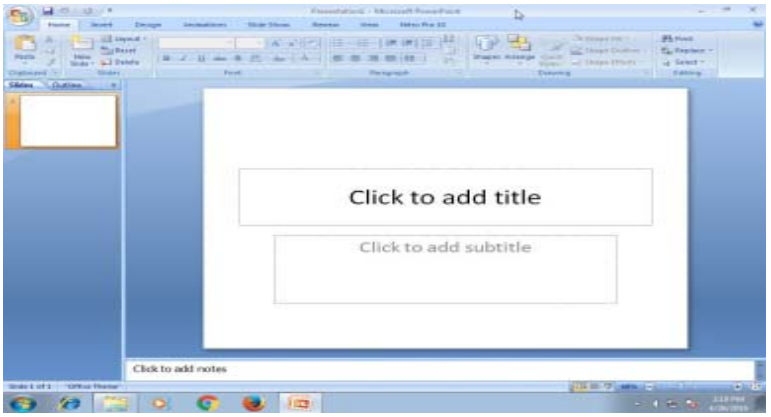


Fig. 5.2 Home ribbon tab

Slide Command Group - This command group includes New Slide drop down menu, Slide Layout drop down menu, Reset option, Delete option, Section drop down menu etc. Below is an illustration of the slide commands.

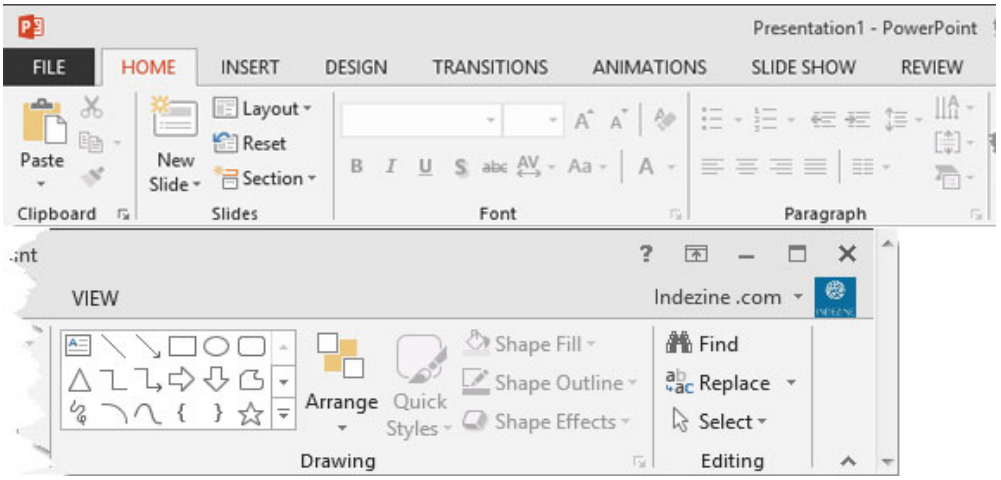


Fig. 5.3 Slide command group

Insert Ribbon Tab - This ribbon is consists of Table, Image, Illustration, Line, Text, Symbol and Media-clips command group. Using this ribbon tab one can introduce the various objects such as Table, Picture, Clipart, Photoalbum, Shape, Chart, Text Box, Header and Footer, Word Art, Date & Time, Slide Number, Symbol, Object, Movie Sound etc. In a presentation.

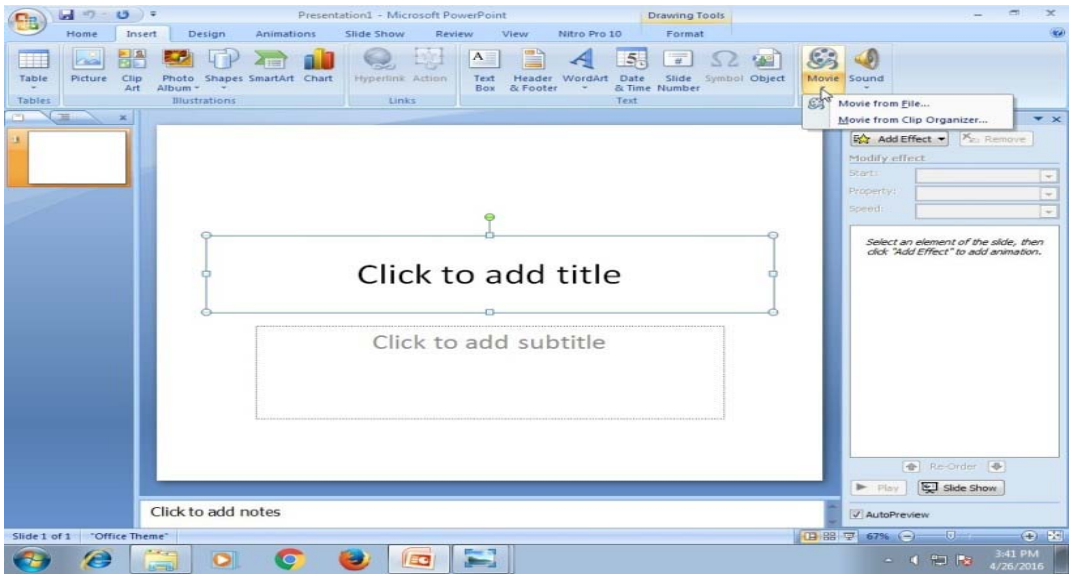


Fig. 5.4 Insert tab

Design Ribbon Tab - This ribbon tab contains three command group like- Page Setup, Theme and Background. The Design Ribbon tab is shown in the figure below.

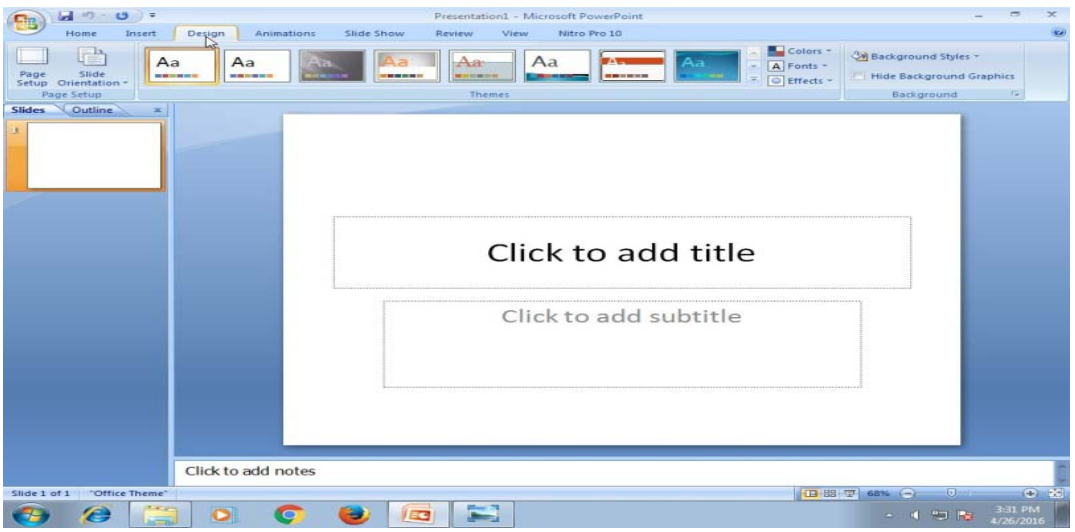


Fig. 5.5 Design ribbon tab

Animation Ribbon Tab - Using various command groups from this tab one can apply different types of animations from Preset or Custom animation tab to the different objects such as Wordart, Picture, Drawing, Clipart, Text etc. among the previously created slides as per need. The Animation Ribbon tab

has three command groups, namely the Preview command group, the Animation command group and the Timing command group. These are described below.

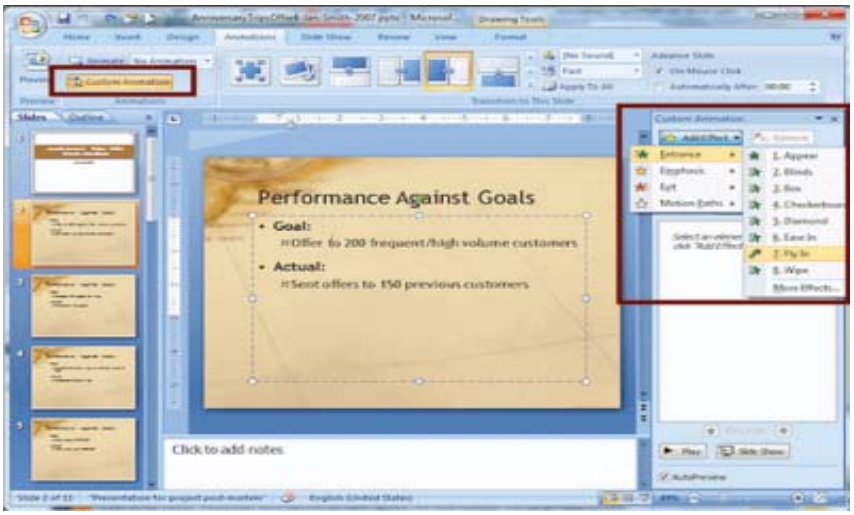


Fig. 5.6 Animation ribbon tab

(a) Preview command group - Animation added to slides by this command group can be seen before slide starts.

(b) Animation Command Group - This command group contains two tools - Preset Animation Tool and Custom Animation Tool. Clicking on the Custom Animation Tool Box will bring up a Task Panel. Various animations are available from the Add Effect button located in this Task Panel, from where the users can add animation to the various functions of a slide according to their own choice.

(c) Timing command group - The various characteristics of the animations added to the slides by this command group such as timing, duration, starting time, which will run earlier, which will run later etc. can be set according to the user's choice.

Transition Ribbon Tab - This ribbon tab contains three command groups: Preview, Slide Transition, and Timing. These are discussed below.

Fig. 5.7 'Transition Ribbon Tab

(a) Preview command group - By this command group the animations and transitions added to the slides can be shown before the starting of slide show.

(b) Slide Transition Command Group - This command group includes Split, Cut, Wipe and Effect options.

(c) Timing command group - The most important command group in the transition ribbon tab is the timing command group. This includes sound. With the help of this command group, the functions such as duration between two slides, automatic display of slides in succession, method of showing slides by mouse click etc. can be done.

Slide Show Ribbon Tab - This tab mainly has three command groups; namely - Start Slide Show, Set Up and Monitor. These are highlighted below.

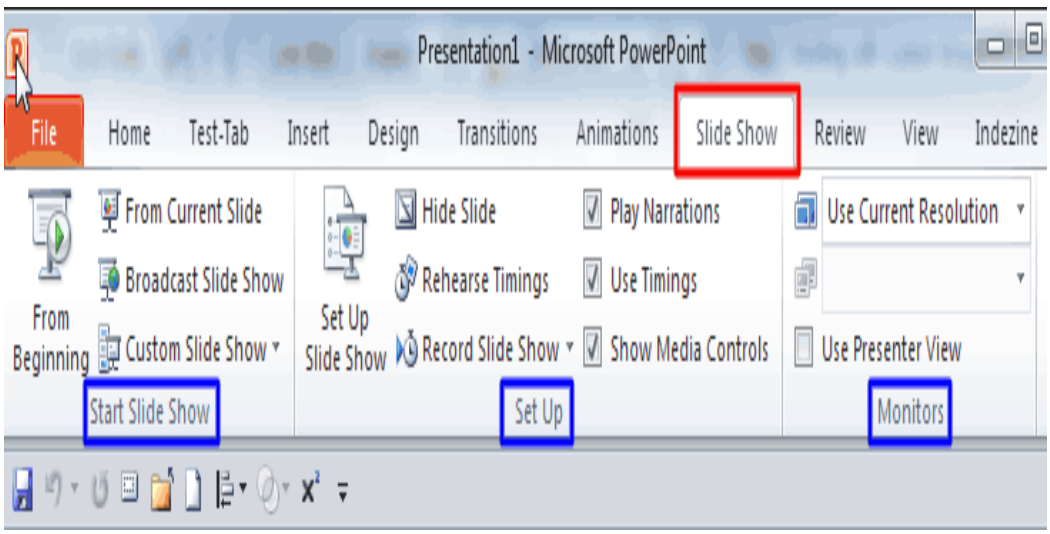


Fig. 5.8 Slide show ribbon tab

(a) Start Slide Show command group - There are four options in this command group. Such as From beginning, From current slide, Broadcast slide show and Custom slide show By clicking on the From beginning option, the slides will be displayed from the very beginning and by clicking on the From Current Slide option, the slides will be displayed from the slide that the mouse pointer is currently on. Clicking on Custom Slide Show will display a dialog box, from where the user can arrange the slides and display them sequentially.

(b) Set-up command group - The options in this command group are Set-up Slide Show, Hide slide, Record slide show and Rehearse Timing. To set up various options related to the slide show, click on Set-up slide show, then a dialog box will appear and select any of the Set-up radio buttons located in this dialog box and click the OK button. The Hide Slide option in this command group can be used to hide a particular slide as needed. In addition, with the help of the next two options of this command group, record slide show and rehearse timing, the entire slide show can be presented automatically by recording the presentation time of each slide of a slide show.

5.4 Concept of Views in Power Point

Various views in Power Point are discussed below.

Normal View - Usually when any work is done in Power Point, this is done in the normal view. Slide design is done on this basis.

Slide Sorter View - With the help of this view, all the slides of a presentation can be seen together. All slides in this view are displayed as thumbnails. A slide can be deleted if deemed unnecessary.

Slide Show View - Presentation is presented with the help of this view. In this view the slide occupies the entire screen of the computer monitor. Press Right Arrow (→) on the keyboard to view the next slide in this view.

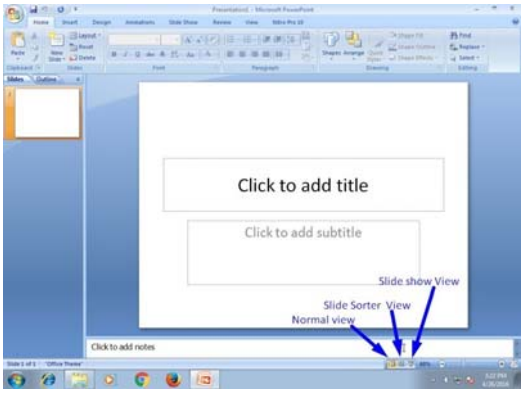


Fig. 5.9 Views in Power Point

Outline View - With this view, only the texts on the slides are visible.

5.5 Slide Design

Various topics related to slide design in MS-Power Point are described below.

Inserting New Slide

To add a new slide in Power Point, click on the slide tab, then all the slides of the presentation will be seen consecutively. After that select the slide with which you want to add the new slide. In addition, clicking on the down arrow of the New slide option in the slide command group will open the slide layout gallery. From there, if the user selects the slide of his choice, the slide will be inserted. Another way to insert a slide is to right click on the slide after which the new slide is required in a presentation, and click New slide. The keyboard shortcut to create a slide is Ctrl + M.

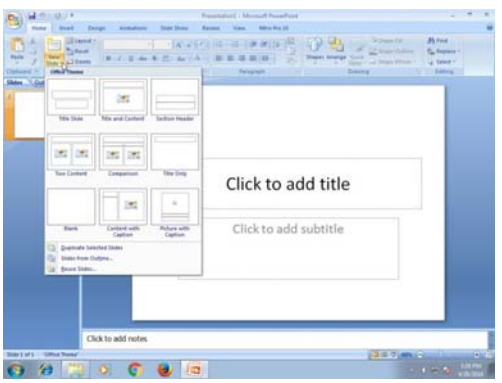


Fig. 5.10 Adding a new slide

Inserting Clip Art, Picture, Graph

To add clip art to a slide, follow this procedure: **insert → clip art.** Then select the desired image and double click on it or select and press OK button. Then the desired image will be added to the slide.

To insert a picture to a slide, first **Insert → Picture** method is to be followed. Then select the desired image and click OK to add the desired image to the slide.

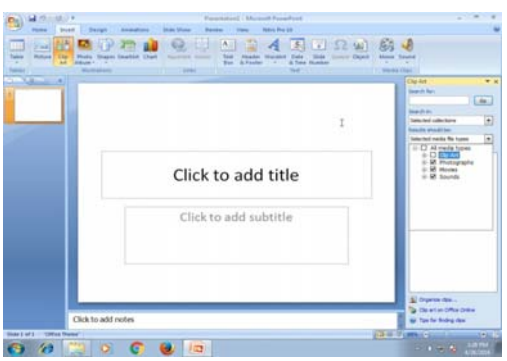


Fig. 5.11 Side design

To add a graph or chart to a slide, select the slide first. Then click on the Chart command in the Illustration command group of the Insert tab to display the Insert Chart dialog box. After selecting the required chart and pressing OK, a dummy chart will appear and an MS-Excel file will open next to it. The chart will change according to data addition or deletion i.e. data editing. After editing is over, the Excel file is to close and save.

Use of Text Art or Word Art in Power Point

To add Word Art to Power Point, click on the Word Art option in the Text command group of the Insert tab. Select the preferred style from the gallery and the text "Your Text Here" will appear on the slide. Now the text should be edited as necessary.

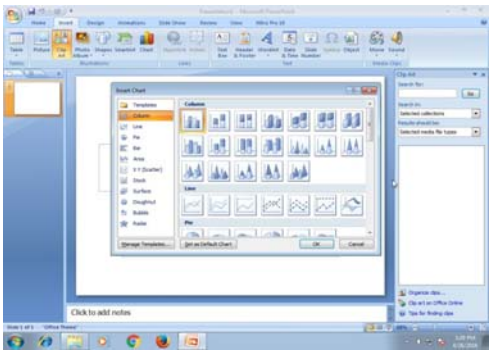


Fig. 5.12 Adding charts and images

Use of Animation, Movie Clip and Sound

The dialog box will open if you first select the object of the slide to which the animation needs. to be added and click on Custom Animation from the Animation group of the Animation tab. Then click on Add Effect Button and four options (Entrance, Emphasis, Exit, Motion Path) will be displayed. Select effect as required and click on Play or Slide Show button to preview the animation. To add a movie to a slide, click the down arrow for Movie in the Media Clips group on the Insert tab. In this case there are two options like - Movie from file and Movie from Clip organizer will be shown. On clicking Movie from file option - you have to select the movie file from the computer. On the other hand, if you click on Movie from organizer, the Clip Art dialog box will open with some movie clips. Then select the desired movie.

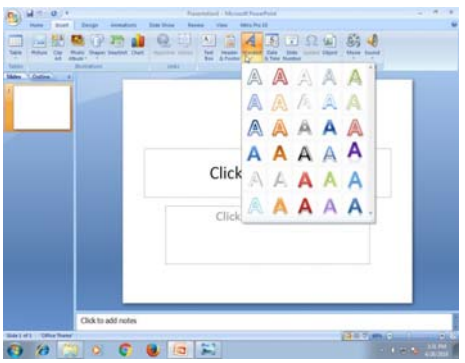


Fig. 5.13 Adding word art

The procedure for adding sound is similar to that of a Movie clip. Here, clicking on the sound down arrow of Media Clips in the Insert tab will bring up two options: sound from file and sound from clip organizer. Click on Sound from file to select sound from computer. On the other hand If you click on sound from clip organizer, many sound options including clip art sound will appear and you have to select the sound you like. After that a message will appear with two options, one is Automatically and the other is when clicked In this case, if you select. Automatically, the sound will play when the sound comes on the screen. On the other hand, when clicked is selected, the sound icon will not sound until it is clicked.

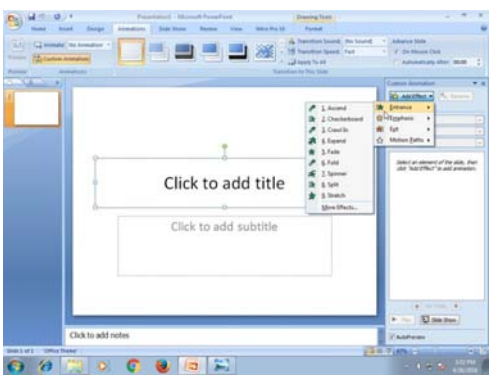


Fig. 5.14 Use of animation

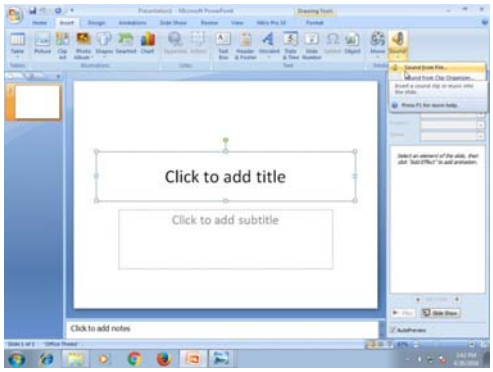


Fig. 5.15 Using movie clips

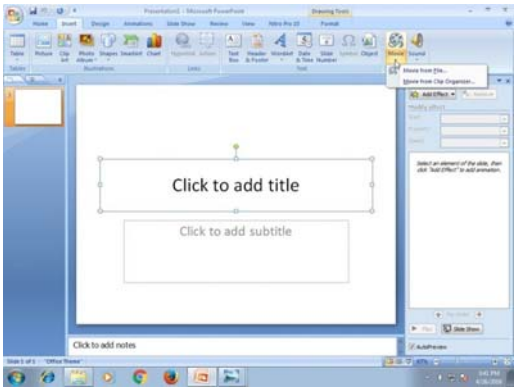


Fig. 5:16 Use of sound

5.6 Slide Show and Slide Printing

First the presentation to be displayed should be opened. Then click **View → Slide Show** in this order. The same can be done directly with the help of F5 button. Then press the Page Down Key on the keyboard to move to the next slide. To exit midway during the slide show, press the Esc button on the keyboard.

Select Print option from Office Button to print slides in Power Point or press Ctrl + P to open the Print dialog box. Select the various printing options here and click OK to start printing. If you want to see the print preview before printing, click **Print → Print Preview** from the Office button accordingly.

Incidentally, if you select the current slide and give the print command, only the specified slide will be printed. Again select the Slide option and as many numbers are written in the text box as many slides of the presentation will be printed.

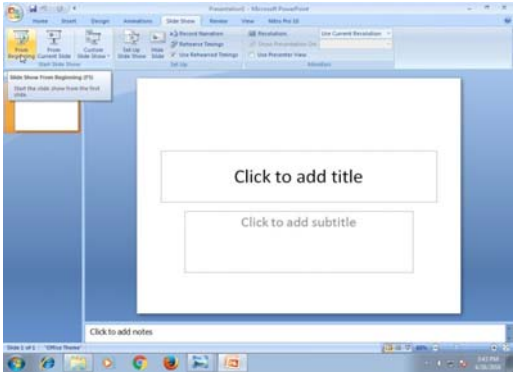


Fig. 5.17 Slide presentation

5.7 Planning Lessons by Using Power Point

To prepare a lesson plan through Power Point the student needs to keep the following points in mind before making the slides.

- Before preparing the slide, it is better to collect the content that will be written on the slide in one place and write it down in a notebook.
- Preselect which images, diagrams, or clip art will be placed.
- Slide titles can be bolded and capitalized and it is best not to exceed the font size 20.
- A slide should not have too many lines.
- If you want to place the table, it should not be too big.

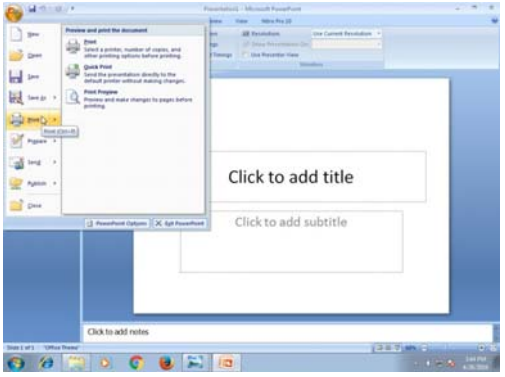


Fig 5.18 Hide printing

An example of Lesson Plan using Power Point is shown below:

District Institute of Education and Training

Kalanabogram, Bardhaman

Trainee Teacher Name: Sourav Mondal

Roll No.-17

Session: 2013-15

Class: IV

Unit: PICNIC

Sub Unit: PICNIC

Today's Lesson : PICNIC

Time: 40 Min.

PICNIC

Golam Mustafa

Nuru, Pushi, Ayesha, Shafi — all have come,
As if they laughed under the Mango Yard!
Cooks' hobby coocking has fallen, no one,
Sleeps in this afternoon of Boshekh month.
Parents are sleeping with them, having this benefit
A few naughty girls met today at the picnic!

Write the meaning:

Yard

A: Garden

Sweet

A: Honey

Q: Who have came to play the Picnic?

A: Nuru, Pushi, Ayesha and Shafi

Q: Where did all come to play?

A: Under the mango garden

No one has sleep in this afternoon of the month

All have sit to _____ preparation

Write sentences with the words:

PICNIC

PREPERATION

District Institute of Education and Training

Kalanabogram, Bardhaman

Trainee Teacher Name: Sourav Mondal

Roll No. - 17

Session: 2013-15

Subject: Mathematics learning using Computer

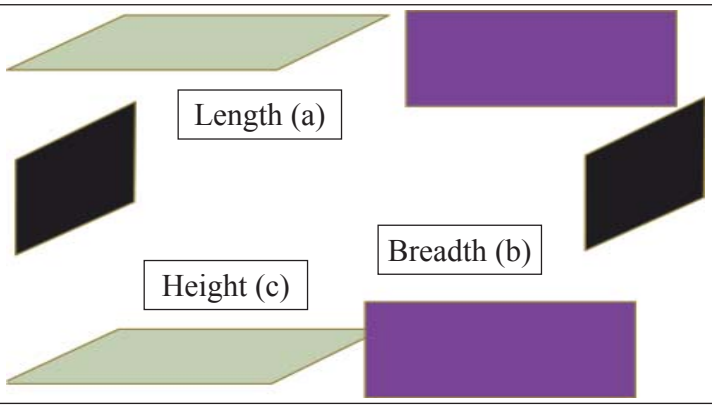
Class : VIII

Unit : Rectangular Parallelepiped

Sub Unit: -Do-

Today's Lesson: -Do-

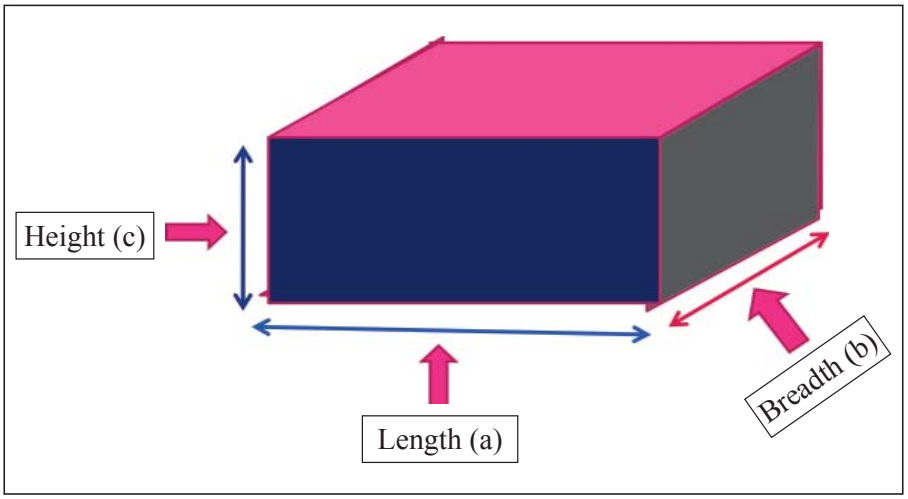
Time: 40 Min.



Total Surface Area of Rectangular Parallelepiped

= 2 (Length x Height + Length X Breadth +
Height X Breadth)

= 2 (a X c + a X b + b X c)



Choose the right alternative:

1. Total No. of surfaces of a rectangular parallelepiped is

   a) 4 b) 3 c) 6

2. No. of vertices of a rectangular parallelepiped is

   a) 6 b) 8 c) 4

3. Total surface area of a rectangular parallelepiped with length 6cm. breadth 3cm. and height 2cm. is

   a) 36 sq.cm b) 72 sq.cm c) 54 sq.cm

1. Total surface area of a cuboid with side 5cm. is
   a) 125 sq.cm b) 150 sq.cm c) 25 sq.cm

2. The volume of a cuboid with side 5cm. is
   a) 125 c.c b) 150 c.c c) 600 c.c

5.8 Summary

- In this chapter PowerPoint of Microsoft Office is discussed. PowerPoint is an important tool within Microsoft Office applications. It is also called a presentation software.
- PowerPoint has four views - Normal View, Outline View, Slide View and Slight Shorter View.
- Text, images, clip art, charts, graphs, etc. can be added to the slides as needed. To make the slide interesting Animation templates, sounds etc. can be added.
- Pre-fixing the topics of the slide presentation makes the presentation easier.

5.9 Unit End Exercises

(1) What is power point?

(2) What are the things that are need to be known to make a presentation on Power Point?

(3) How to add images to slides? Discuss in detail.

(4) How to add charts from Excel to slides? Discuss in detail.

(5) What are the advantages of using PowerPoint?

(6) How to add a sound or video clip to a slide?

Project Work

(1) Prepare a lesson plan in Power Point as per your choice at upper-elementary level with the features below:
   (a) There shall be at least 10 slides.
   (b) Animation should be used for slide transitions.
   (c) Add custom animations like - Entrance, Emphasis, Exit, Motion Path etc.
   (d) Add appropriate video clips and audio.
   (e) Automatic slide presentation option should be used.

UNIT 6

Computer Aided Learning

6.1 Introduction

"Chalk and talk" method of learning is considered obsolete in the present era. Because the medium of learning in this method is chalk and talk which creates an atmosphere of boredom in the classroom and students lose interest in school. Present age is the age of information technology. Today computers are being used successfully in various fields of technology. The 3Rs of learning are now broadly accepted as the 4Rs. There are reading, writing and arithmetic with ROBOT or extremely powerful computer is assumed. Currently we use three 'A' words in learning. These three 'A's are Age, Ability and Aptitude. Advancement in technology in the modern age makes it possible to present the educational content vividly and attractively through computers. As a result, each student's interest in the classroom, acceptance of the content is increasing and clear concepts are being formed. Based on the application in different fields, computer-aided education has various names. For example-

- Computer Aided Learning (CAL)
- Computer Aided Instruction (CAI)
- Computer Based Training (CBT)
- Computer Managed Instruction (CMI)

- Computer Mediated Education (CME) and
- Computer Assisted Instruction (CAI)

6.2 Objectives of the Unit

After reading of this unit learners will be able to

- Describe the basic concepts and essential methods of computer-aided learning.
- Prepare learning content through computer will be known.
- Understand the application of learning aids to content instruction.

6.3 Computer Aided Learning-Concept Formation & Method Application

The concept of CAL is basically born as a result of the increase in the use of programmed instructions in computer. Through Computer programmed instruction a large amount of information is stored for teaching and that information is also used for teaching when needed. In one word we can say that CAL is an instructional tool and it can be used by students to learn different subjects in a specific range of instructional methods.

CAL originates from observing how computer programs work in humans. At earlier experimentation was started with the program. These programs were to print computer stored information, evaluate answers to multiple choice questions, etc.

PLATO (Program Logic for Automatic Teaching Operation) was introduced at the University of Illinois in 1960. Later, in 1996, Stanford University professor Patrick Sapps introduced computer-based tutorials on mathematics and language at the elementary level. Since then, many more CAL programs have been developed and implemented and also ncrease the use of computers in education.

There are three methods of computer aided learning; Such as Logo (Logo), Simulation and controlled learning.

Logo:

A notable method of learning through CAL is called Logo. This method was discovered by two professors named Feurzeing and Papart of MIT University. Logo programming language is very easy and simple. That is why it is suitable for child education. Children can draw pictures according to the instructions of this kind of program. Sometimes children can create their own programs to perform their required task as per their need.

Simulation:

A higher level of instruction can be provided through CAL's simulation method than Logo. Two categories of this approach are Simulation and Gaming. PLATO and PLATO IV are used here. For example, how fruit insects reproduce or grow can be shown through simulation method. It usually takes three weeks for flies to reproduce in the laboratory, and more longer time is required if the flies die. In this case, the whole process can be demonstrated very quickly in the PLATO program in the simulation method.

Controlled Learning:

The third type of CAL is Controlled Learning. Here the student can practice again and again just like in the classroom. The teacher only teaches one-time how to use the methods. Students can then practice on the computer themselves over and over again and understand where they are going wrong. In fact the CAL system is built on tested concepts. As a result, its acceptance in teaching and learning methods is high. Some of the concepts on which CAL is prepared are described below:

- 4000 or more teachers can use this system simultaneously from different terminals connected to the CAL system without any degradation in quality.
- Through CAL, as the student learns, it **is** recorded in the computer. As a result, the teacher can evaluate the student by looking at the recorded part.
- Through CAL, a variety of content can be presented to students in a variety of ways. In this case, it should be remembered that what strategy the teacher will adopt, what will be the write ups, what will be the pictures; all must be decided in advance.

6.4 Preparation of Learning-Teaching Materials by using Computer

The modes or processes used to prepare learning teaching materials for computer aided teaching are tutorial mode, drill and practice mode, simulation mode, discovery mode and gaming mode. These are discussed below.

Tutorial mode:

In this mode a question is given after giving information in small step. Students' answers are analyzed on computer and feedbacks are given as needed. This mode is equivalent to linear programing instructions, and both linear and branch methods can be used in this case. Below is an example of how to create learning materials using this method.

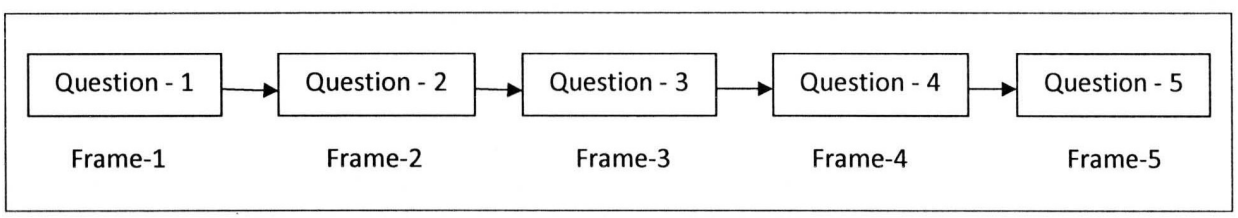


Fig. 6.1 Preparation of learning aids in Linear Method

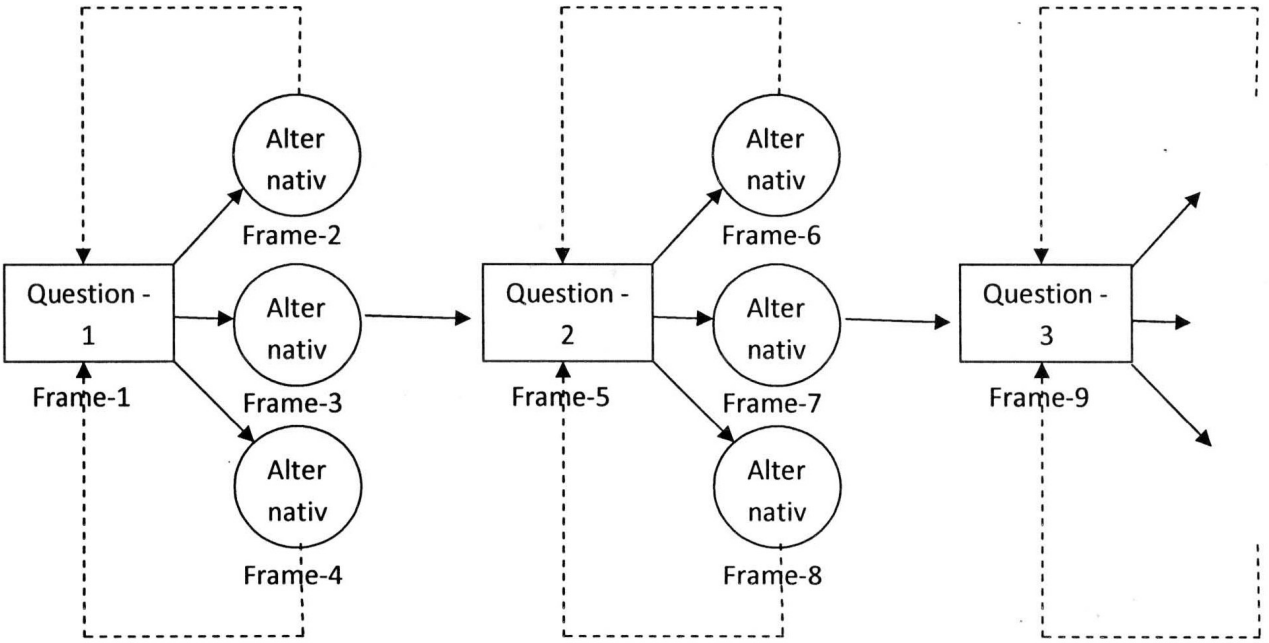


Fig. 6.2 Preparation of learning aids in Branch Method

Drill and practice mode:

In this method, students are presented with examples of simple to complex concepts or principles, in a sequence. Examples are given from easy to difficult concepts mainly to make students master through activity. In this case, students are encouraged by reinforcing all the correct answers and try to find the reason for the wrong answers and correct them.

Simulation mode:

In this mode, the learner is consistently given instruction that matches the real life situation. Such content is selected by the computer so that the both time and money will be saved. For example- airplane ride, collision between two objects etc.

Discovery mode:

Descending procedure is followed in this mode. Generally in this mode the learner is taught through trial. and error method.

Gaming mode:

In this method, the student is instructed by playing on a specific subject with another person on the computer. The quality of learning depends on the nature of the game. For example- spelling games, general knowledge games etc.

6.5 Application of the Learning-Teaching Materials

Application of CAL Materials in the 21st century has opened new horizons in modern education. The preparation and application of learning aids through computer in learning has made learning more interesting and effective. The tasks that students or teachers do to prepare these CAL materials can

be divided into five categories. These are Lesson Planning, Information Collection, Testing & Test Construction, Instruction & Teaching and Evaluation.

Creating CAL material requires the use of an application software called Powerpoint and to use these materials CAL Oriented classrooms are required. The summary of the steps **in** preparation of CAL material are discussed below.

Lesson Planning:

At this level the topic selection, what parts of the topic will be covered and how the learning will be conducted are planned.

Information Collection:

The contents of the CAL are collected by planning at this level. In this case, text and images are collected from different sources.

Testing & Test Construction:

At this level the collected information is sorted and the selected information or text is written in one place and used in the appropriate places.

Instruction & Teaching:

At this level, where the text or image is to be used in the learning phase is indicated so that the teaching of that content can be accomplished through CAL.

Evaluation:

A number of questions are asked to assess the learning content at this level. Below a lesson plan with examples is shown.

District Education and Training Organization

Kalanavgram Burdwan

Teacher Name	:	Kamal Roy
Serial Number	:	38
Academic year	:	2013-15

Subject: Environmental Education through Computer

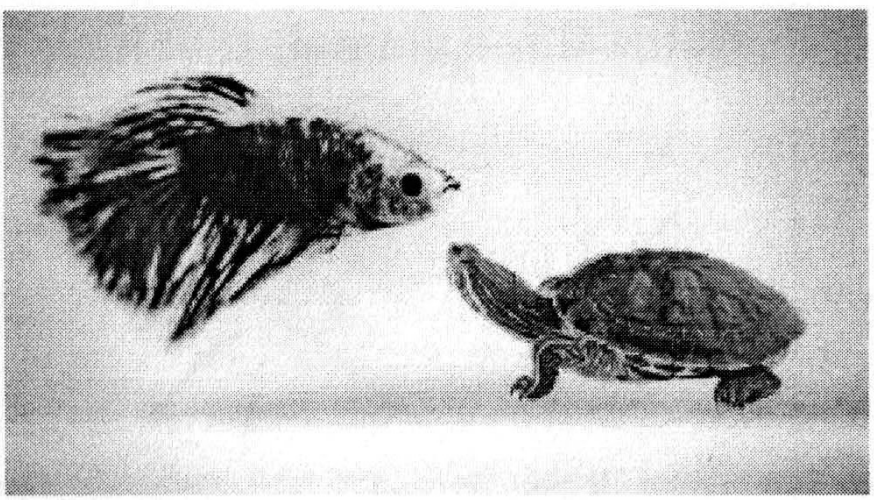
Class : IV

Unit: The components of the environment are the biota

Subunit	**:**	Different types of animals
Today's lesson	**:**	-Do-
Time	**:**	40 minutes

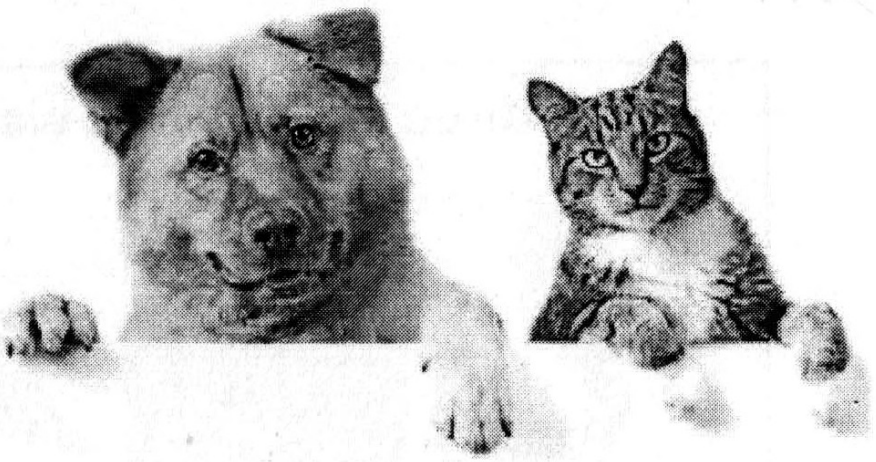
Tell me how many animals are around us! Someone flies. Someone swims. Someone walks on four legs. Someone walks on two feet. Some have too many legs. Someone walks into the chest again. Someone lives in the water. Some are quite happy underground. All animals have the right to live. They have different colors. They are each beautiful in their own place. They find their own place. Collects food. Gives birth to new creatures. There are also several animals that cannot be seen with the naked eye. This is how we all live together in the same environment.

Name two animals that live in water



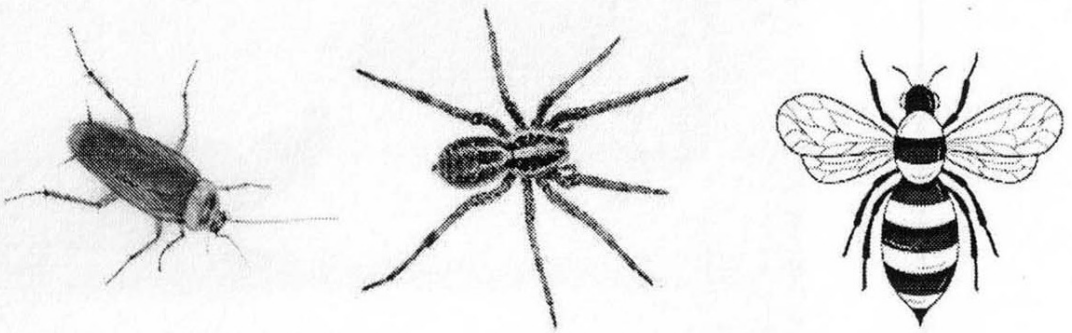
Fish and Turtle

Name two animals that walk on four legs.



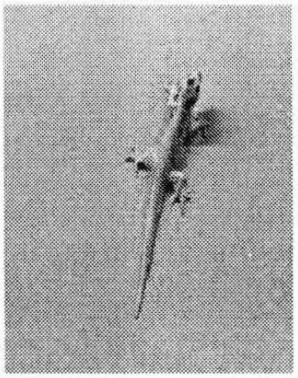
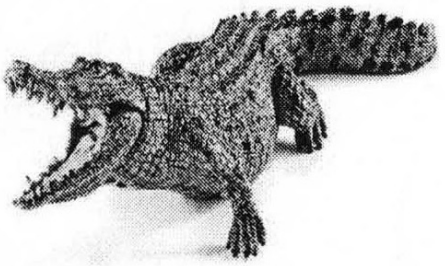
Dogs and cats

Name three animals that have many legs.



Cockroach, Spider and Bee

Name three animals that walk on chest.

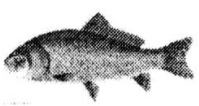




Snakes, lizards and crocodiles

Also given are pictures of two animals.
Write a similarity and a difference between them.

Animals





Animals



Fish and Turtle

6.6 Application of CAL Materials in the Instructional System

Actually CAL or Computer Aided Learning is a system of coordinating computer hardware, software and curriculum that can be used in all subjects and at all levels. Here is a discussion on how to teach reading at the elementary level. In this case, the student will sit in front of the computer monitor and use the keyboard or mouse if necessary. This method basically has three levels first level, second level and third level.

First level:

At this level, first a character is shown on the screen by the computer. Now the student is asked with the help of recorded voice to identify the letter and to show the correct letter with the light-pen on the monitor. In this way one by one letters are shown and the student is asked to identify the correct letter. This method is shown with the help of a figure below.

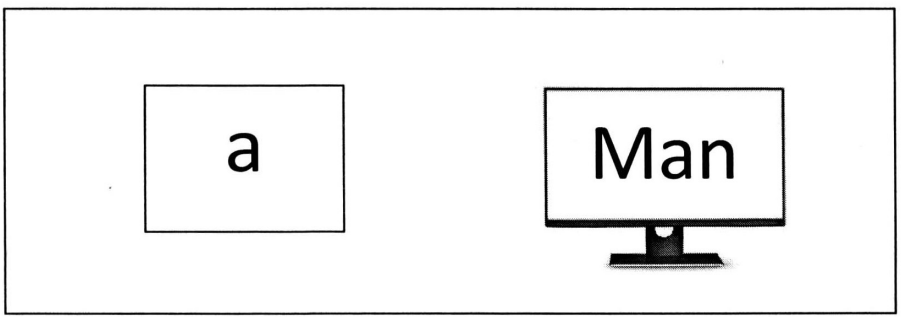


Fig. 6.3 First layer

Second level:

Once the characters in the first level are introduced, the second level begins. Here some pairs of words are given on the screen and asked to mark them with some associated letters on the monitor. This method is shown with the help of figure below.

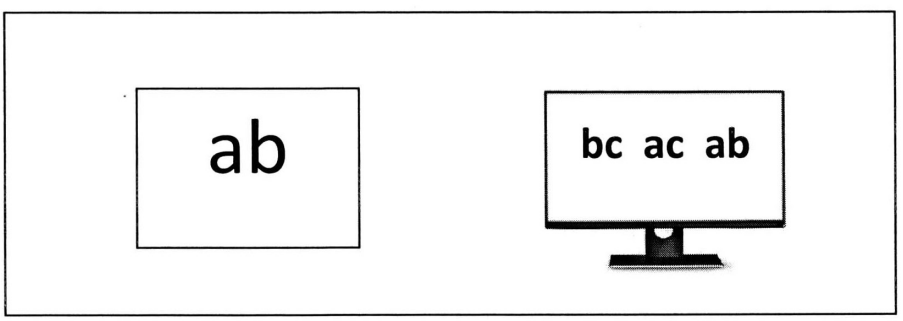


Fig 6.4 Second layer

Third level:

At this level the monitor has multiple associated letters and numbers on one side and multiple associated letters on the other side. It is said to identify those words that have complete similarity.

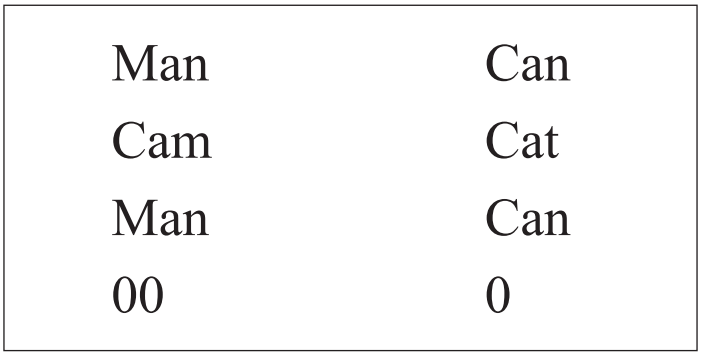


Fig. 6.5 Third layer

In the monitor the words Man, Cam, Can, 00 are on one side and the words Can, Cat, man, O on the other side. The student will identify the words that have complete similarity. In this case, the word Can is completely similar. Then the student will gradually be able to pronounce meaningful words. The computer recorded voice will help the student if the answer is wrong and praise if it is correct.

6.6.1 Role of Teacher in CAL Process:

If the student makes a mistake in learning through CAL method, the computer instructs the teacher and the teacher tries to teach the student through personal assistance. In this case, if many students face the same problem, the teacher tries to modify the program again. It can be said that the CAL method does not minimize the role of the teacher, rather utilizes their skills to create a better learning environment. Currently, CAL is highly standardized in education using "Intelligent Tutoring" methods. To prepare a complete CAL system requires a few skilled people. They are highlighted below:

- **Computer Engineer -** Responsible to provide all support related to computer hardware and software for CAL system preparation.
- **Text writer -** usually a teacher does this.
- **System Operator -** He acts as a mediator between the system and the student in all CAL arrangements.

6.7 Project Activities on Preparation of CAL Material

The term project was first used by PR Richardson in 1900. While defining project in 1908, Dr. Stevenson said project is a problem-solvic task which is attempted to be solved in a natural environment. In short, al project is a purposeful problem-solving task to be accomplished through **active** and spontaneous behavior in a normal-life based social environment. Teaching through CAL is a project-based activity that engages students. in learning, sparks interest and increases the acceptance of the contents. In this project based work students are able to make the project real through four levels. These levels are discussed below:

(a) Objective determination level:

At this level, the teacher discusses the content with the students and identifies its characteristics or purposes and explains to the students how it will be used. Students can learn about what specific knowledge they will gain by making this project.

(b) Planning level:

After the objective of the content is determined in the first level, how to solve the problem with the help of the teacher is planned in this second level. How much content will be covered, how the work will be divided into parts, what kind of data will be collected, are also planned at this level.

(c) Performance level:

The content planned in the second level is implemented in this level. Students, with the help of the teacher, use their own judgment to complete the tasks of creating learning content through computers, using technology. Power point software, web tools, sound recording etc. are used in this case. Teacher monitors students' work at this level.

(d) Assessment level:

At this level, the teacher and students discuss the results of the task after it's completion and the teacher evaluates the students' work.

How learning content is prepared is explained with the help of example.

Subject: Environmental Education through Computer

Class: IV

Unit: Clothe

Sub-Unit: Change of clothes with seasons

Determine Objectives:

1. Being aware of what we wear as the seasons change.
2. Know which clothing dries quickly during monsoons.
3. To gain knowledge about different clothes in different seasons.

Plan:

Students will divide into groups and complete the task with the help of the teacher.

First team: will collect seasonal data.
Second group: will collect photos related to seasons.
Third party: will coordinate this information and images.

Actions:

Students will create CAL materials using various technologies (Power Point of MS-Office, Multimedia Web etc.) through computer with information or text and images collected **at** planning level. In this case the teacher will monitor and guide their work.

Assessment:

At this level the student is assessed by preparing some fill-in-the-blank questions, multiple choice questions, etc. to make the CAL content more interesting and useful for learning. All the topics are presented with examples below.

District Education and Training Organization
Kalanavgram, Burdwan

Trainee Teacher Name: Shambhunath Ganguly

Serial Number: 42

Academic year: 2013-15

Topic:

Education of our environment through computer

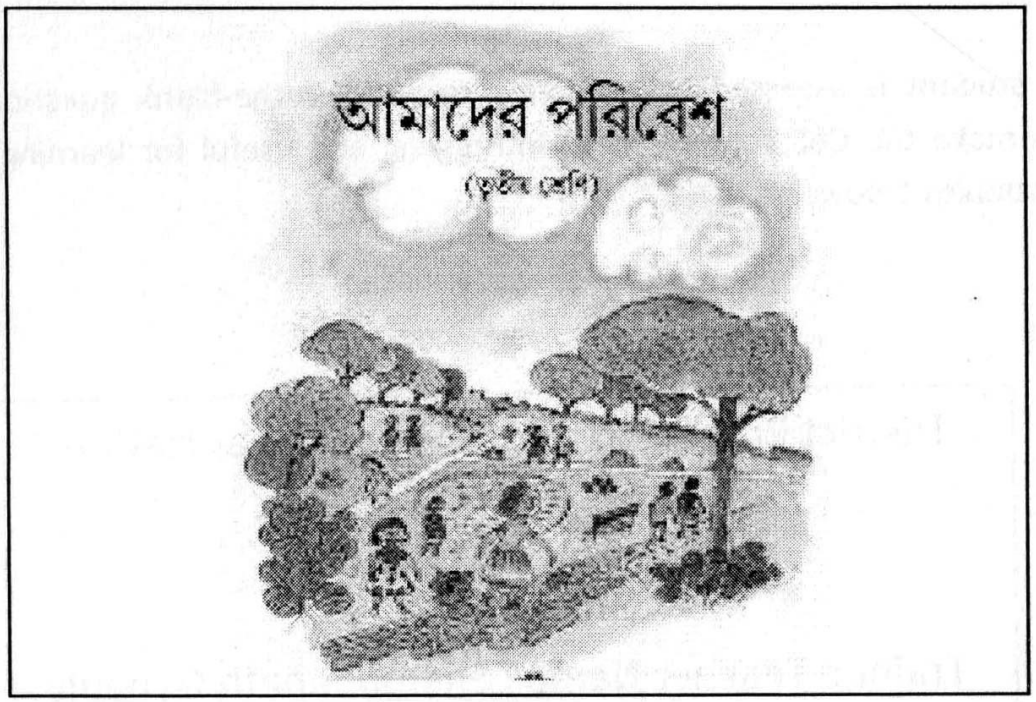
Class: IV

Unit : Clothing

Sub-Unit : Change of clothing with change of seasons

Today's lesson : -Do-

Time: 40 minutes



Topic:

Education of our environment through computer

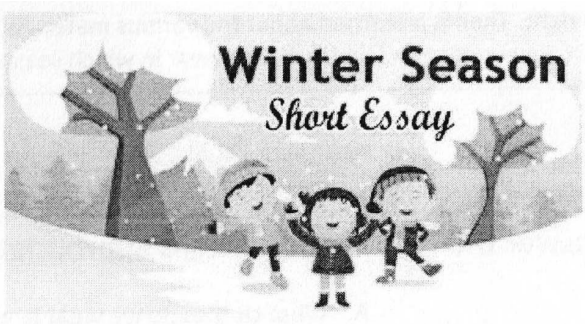
Class: IV

Unit: Clothing

Sub-Unit : Change of clothing with change of seasons

Today's lesson: -Do-

Time: 40 minutes



Change of Seasons Change of clothes

The clothes that people wear during work, they don't wear at other times. Nobody wears school uniform at home. Everybody wear different clothes when they go outside.

During the winter, however, different colored sweaters which they have can be worn at school. Munni wears a floral sweater. Babai comes wearing a open chest coarse sweeter.

During winter, many people wear different types of cloaks. Some are of coarse wool. Some are of very fine wool. On watching it can't realize that they are oven with wool.

Great-grandmother said, very few of them had sweaters when they were children. There was a doctor. He wore court and pants like gentlemen. Other people in the neighborhood used to wear cloaks in winter. Some wore two or three clothes.

Baisakhi said to Miss - Didi, now more sweaters are available than before. Grandmother said-

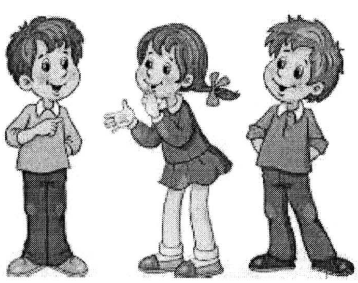
Sutana said - From what Sympathetic trolls are made of.

Didi said - from mineral oil.

She said again the raincoat that you wear during the rainy season is synthetic. Many people wear synthetic sarees during monsoons. Dries quickly, does not scratch. They are also made from that type of oil

Wasim said - cotton clothes are good for wearing in summer, isn't it?

- You are right. Then it is learned about the various materials for making clothes. Do you understand which one to wear in which season?



Answer the following questions appropriately

A. What clothes do we wear in winter?
Answer:- Sweaters, sheets **etc.**

B. What is synthetic wool made from?
Answer :- From mineral oil.

C. What do we wear during the rainy season?
Ans:- Monsoon, Sympathetic cloth etc.

Answer the Questions in Groups

Q1. Why is it better to wear a synthetic saree during the rainy season?
Ans. - dries quickly, does not wrinkle when cut.

Q2. What is the English equivalent word of 'season' and 'clothing'?
Ans. Season - TIME clothes - DRESS.

Answer the Questions in Groups

Q1. Why is it better to wear a synthetic saree during the rainy season?
Ans. - dries quickly, does not wrinkle when cut.

Q2. What is the English equivalent word of 'season' and 'clothing'?
Ans. Season - TIME clothes - DRESS.

Answer in your own words (discussing in group)

A. What clothes are good to wear during the summer?

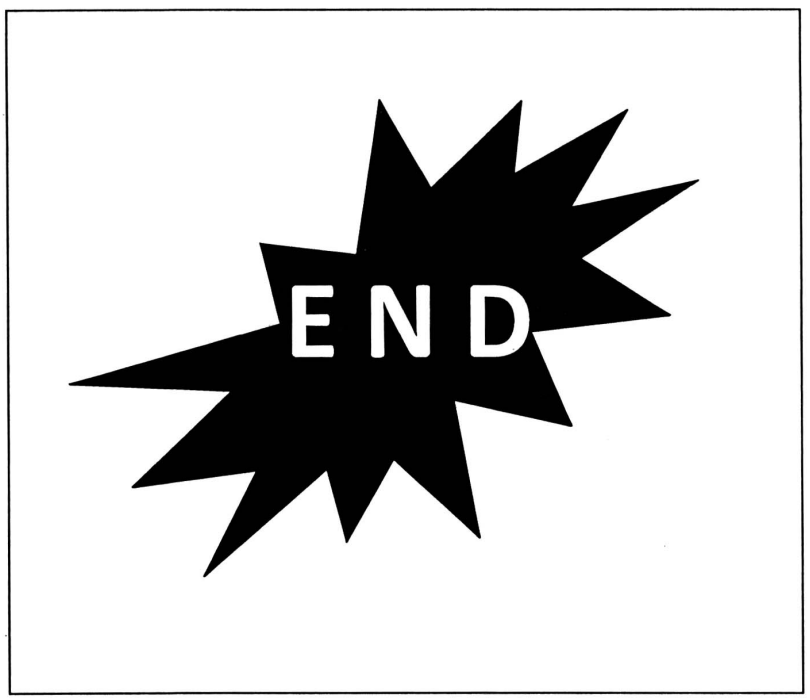
B. Fill in the chart below-

Name of Dress	Used in Season	Why it is used	Picture of the dress

C. In which season we use umbrella?

D. In which season Cloaks are used? (summer/winter)

E. In which season we use Rain Coat?



6.8 Summary

- Computer-mediated learning has various names based on its application in different areas of computer-mediated learning management. Like CAL, CAI, CMI, CBT etc.
- The use of CALS has expanded since the introduction of program learning.
- Basically three methods are used in computer aided learning process logos, simulation and controlled learning.
- The modes used to create learning materials through CAL are Tutorial mode, drills and Practice Mode, Simulation Mode, Discovery Mode and Gaming Mode.
- It must be remembered that a computer or any device can never take the **place** of a teacher.

6.9 Unit End Exercises

(1) What does CAL mean?

(2) What are the three methods of learning by CAL? Discuss in detail.

(3) Discuss in detail the modes used to prepare learning aids for computer aided learning.

(4) What are the differences between CAL and CAI?

Project Work:

(1) Prepare a CAL material (minimum 8 slides) on Bengali language at upper-elementary level.

(2) Prepare a CAL material on science at upper elementary level (at least 8 slides).

(3) Prepare a CAL material on cultural activities.

UNIT 7

Web-based Learning

7.1 Introduction

The present age is the age of information technology. The use of information technology is gradually improving people's lifestyles. And the World Wide Web has played the biggest role in the use of this information technology. The World Wide Web is the most widely used, popular and essential of the Internet services or applications. World Wide Web is better known as WWW in short. The architectural framework for accessing the aggregated information of millions of computers connected to the Internet is the WWW, also known simply as "The Web". In short "The Web" is the collection of millions of files stored on millions of computers spread across the globe. These files can contain text, picture, video, sound and various other programs.

Web-based learning has played a major role in today's information technology era. And this web-based learning has had the greatest impact in the field of education. There has been a change in the education system, curriculum and content of education. With the help of the web, students can access a vast amount of information and online systems have also been introduced for examinations. The use of CAL, CAI, CMI etc. has increased to a great extent. At the root of all this is the use of the web. As a result of the use of the Web, on the one hand, students can learn very easily and quickly, on the other hand, that education is permanent.

7.2 Objectives of the Unit

After reading of this unit learners will be able to-

- Get an idea about the World Wide Web (WWW).
- Construct the idea of basics of Internet and its usage will be known.
- Demonstrate use of the web in the learning process.
- Define information exchange and use of e-mail can be learned.
- Acquire the knowledge about passwords and their usage can be gained.

7.3 World Wide Web (WWW)

In 1989, a physicist named Tim Burns Lee gave the idea of WWW and is called the father of WWW. Then in 1991 WWW was first implemented experimentally. The WWW works through hypertext and hypermedia. The first web browser was introduced in 1993. These web browsers are-Internet Explorer, Google Chrome, Mozilla Firefox, etc.

WWW is a graphical Internet service. WWW uses Hypertext Transfer Protocol (http) to link or connect one information to another. The word web is analogous to spider web. The WWW is spread like a spider web all over the world and these connections are made through different Servers. That is, WWW is a series of Servers where the servers have an interconnection among themselves. The host computer user can view or use information or data, graphics, audio, video etc. on his own computer through his own ISP server by browsing and can also download or upload the data if necessary.

7.3.1: Conceptual Frame Work of WWW

From the previous discussion some idea about WWW is obtained. Here's a look at how the WWW works. As already known it is part of Internet and it actually works through Request and Reply method. Here the user sends the required request to his current server and the server gives a response in terms of that request. In this case, after receiving the required response from the server, the connection between the server and the client is disconnected. The protocol through which this Request and Reply method of WWW is organized, is called HTTP (Hypertext Transfer Protocol).

It is explained with an example. Let's say a user types www.google.com in a web browser and presses enter. Here WWW.google.com is a URL. The full name of the URL is Uniform Resource Locator In this case, how Request → Reply is organized is discussed below:

(i) Web receives user-entered URL.

(ii) Then the browser wants to know IP address of specified URL i.e. www.google.com from DNS (Domain Name Server)

(iii) After receiving the required request from the browser, DNS sends the specified IP address as a reply to the browser.

(iv) Then the browser connects to that address through TCP (Transmission Control Protocol).

(v) Browser sends GET command to server.

(vi) The server sends the required response to the browser.

(vii) The TCP connection with the browser is now disconnected.

(viii) Now the browser displays the information contained in the page.

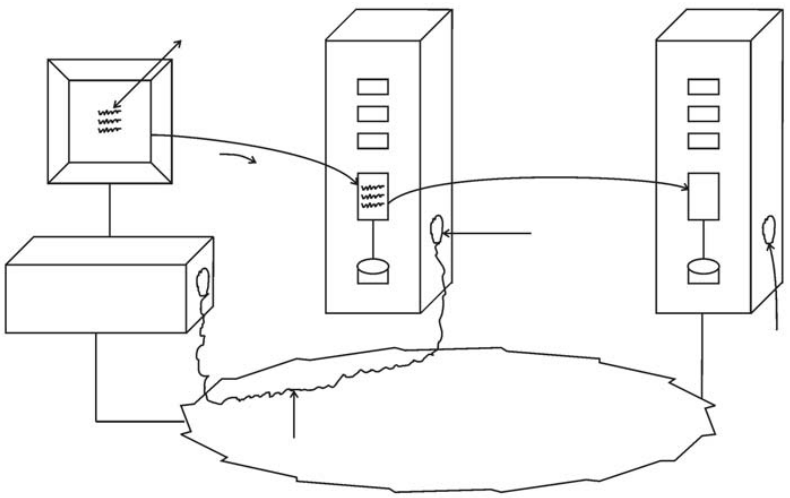


Fig 7.1 Displaying information through a web browser

The image above shows how the information is displayed within the page by the browser.

7.4 Fundamentals of Internet

When two or more machines are connected together to establish mutual connections and exchange information, the system is called a network. When the network is connected through gateways and facilitates worldwide communication services, then that system is called Internetwork or Internet.

The United States Department of Defense created ARPANET (Advanced Research Projects Agency Network) in 1969 as a courtesy to the government. This ARPANET is called the first internet. Then in 1970 Networking Group or NWG created NCP (Network Communication Protocol), because many computers were connected to this network system every day. The first e-mail communication system was introduced in 1972. In 1973, the ARPANET began to spread around the world, starting with the expansion of the network from Norway to England. At this time, FTP (File Transfer Protocol) was used on the Internet to exchange the information. Later in 1983, TCP/IP (Transmission Control Protocol / Internet Protocol) was recognized as the official protocol for data exchange on the Internet. The DNS system started in 1984 and by 1990, 200 networks and 2,00,000 computers were connected to the

Internet. Then the World Wide Web was created for public use. It may be mentioned that a common form of Internet is WAN (Wide Area Network), the collection of LANS (Local Area Network) connected by it is shown below with the help of diagram:

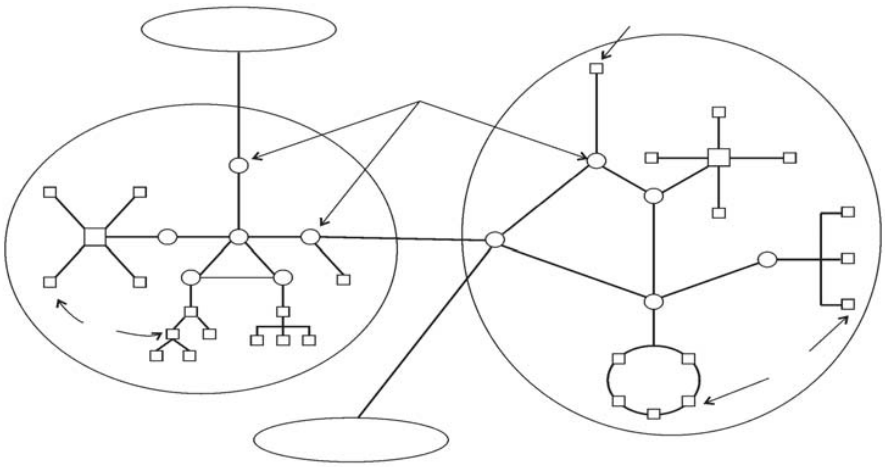


Fig 7.2 A typical Internet connection

Various information is available on various web pages of the internet website and any interested person or organization connected to this internet can access (i.e. read) that information and download it to their machine if necessary.

7.4.1 Concept of Some Fundamental Concepts Used in Internet

If the user wants to get internet service through computer then some hardware and software must be present in the computer. Incidentally, all the organizations through which Internet services are available are called Internet Service Provider (ISP). ISP provides internet service through router. All the computers that are used to collect any information are called servers.

All the hardware or software required to get internet service are discussed below:

Modem:

Fig. 7.3 Modem

The word Modem is the abbreviation of Modulator-Demodulator. In fact, when a computer is connected to another computer through the Internet, the connection is made through a telephone line. But the difficulty is that computers work through digital signals, and information exchange through telephone is done through analog i.e. PSTN (Public Switched Telephone Network) method. These two methods are completely different. Therefore, to bridge these two, a special device is required through which analog signals can be transformed to digital and vice-versa. Modem is one such electronic device whose main function is to convert the signal from the telephone (analog computer load) into digital signal and convert the computer's digital signal into analog. Modems are generally of two types: external and internal. The external modem is placed outside of the computer system thus if required, it can be used from one computer to another after disconnecting it. But the internal modem is placed inside the computer system unit. The speed of the modem depends on how much data or information can be sent per second.

Computer:

A computer is the first requirement to get internet service. A computer needs a higher frequency processor and more RAM for better performance.

The required software:

It is often required a modem and its driver software to be installed to establish the connection with the computer system and to browse the internet a browser or a search engine, which is a software program is also required to be installed.

Browser:

A browser is a special type of software program that can be used to easily search for information on the Internet. For example, while working on a specific topic, going to another web page on another topic, returning to the previous topic or page, etc., can be done with the help of the browser. The main function of the browser is to provide the source of information to the user. When the user accesses a Uniform Resource Locator (URL) through the browser, the browser starts working. For example let's say a URL is http://scernwb.org. This URL has two parts, the first part is http and the second part is scertwb.org separated by :// signs. The first part indicates that information can only be collected using Hypertext Transfer Protocol (HTTP). Since the Internet is a hyper media, Hyper Text Markup Language (HTML) is used here. Therefore, in order to exchange information written in hypertext format, web browsers must use the Hypertext transfer protocol (http). CSS (Cascading Style Sheets) is another protocol that allows web browsers to use graphical interfaces on the web. Such browsers are Microsoft Internet Explorer, Mozilla Firefox, and Opera etc. The second part i.e. scertwb.org refers to the domain name.

Search engine:

Search engine is a tool used to find information available on the WWW. After searching, the data is presented as a list called hits. The first search engine was created by 'Alan Emtage' in 1993 and the name of this search engine was 'Archie'. Then came Gopher Search Erin in 1991. Currently there are more types of search engines. Some of them are Netscape, yahoo, Google, MSN etc. Search engines. work in three steps - Web Indexing, Crawling and Searching.

Search engines collect and store web page information and then deliver this information to the user through html. Web pages are collected using Web crawler. Sometimes these crawlers are called 'spiders'. Indexing is the process of analyzing page by page to determine how to index or list. When a user searches for information in a search engine, the search engine analyzes the information gathered in its index and creates a list and gives it to the user. But every search engine has its own characteristics by which it decides which information is more important and which is less important.

Browsing or Surfing:

The word browsing or surfing means to search or search. Searching for data or information using the internet is net surfing. When a browser is instructed by a word or gesture, the browser lists the information. Retrieving information on the internet with the help of this list is net surfing. Surfing can be done through search engines like Internet Explorer, Google Chrome, and Mozilla Firefox etc.

7.5 Uses of Internet

Nowadays, the use of internet is increasing in almost every aspect of life. The widespread use of the Internet in various fields of social life has brought many benefits in various activities. Internet usages are discussed below.

In Education:

The use of internet in education has brought a revolutionary change. Information required for various educational and research activities can be collected through the internet. Information on various topics, articles, research papers, etc. can be easily found by searching various websites. The internet has brought information about admission in various educational institutions in abroad within our reach**.** Not only that, in the case of online admission, form fill up, form submission etc. can be done very easily and quickly through internet at home. Students can participate in various competitive exams (like GRE, CAT) and know the exam results using internet.

In Business:

Almost all things according to our choice can be purchased from home using internet. It is possible to buy and sell goods from any part of the world using the internet. This type of business is known as e- commerce. Internet is a helpful medium for booking train and air tickets and booking a hotel room. Insurance premiums, electric bills, telephone bills etc. can be deposited through the internet from the comfort of your home. Many banking tasks can be done from the comfort of home with internet banking. Various business organizations can advertise their various products through web pages on their own websites to promote their business.

As a medium of communication:

Internet is a fast, cheap and popular medium of communication. Information, messages, files, etc. can be exchanged from one end of the world to the other in a very short time and at low cost through e-mail. In this case, both sender and recipient need to have an e-mail address. Another easy way to communicate through the Internet is instant messaging. Instant messaging is a service on the Internet through which a user can establish real time communication with one or more users. In this case, not only text messages, but pictures, videos, etc. can be exchanged and voice or video chatting can be done. WhatsApp is a popular instant messenger. Through social networks (like Twitter, Facebook) on the internet, you can communicate with friends and relatives; you can also build new friendships and express your own opinion. Apart from this, other means of communication with the help of internet are Internet Telephony, Web conferencing etc.

In entertainment:

With the passage of time, the Internet has emerged as an essential medium of entertainment. Online games, listening to music, watching movies, etc. are available on the Internet. There are different types of websites. From where you can download songs, videos, games etc. for free or at little cost. Internet versions of various books can be read online or in many cases can be downloaded. Now it becomes possible to watch their various programs from the sites of various TV channels.

In government work:

The use of internet has played a very important role in the work of various government offices. Almost all the government departments have their own websites from where information related to the activities of the respective departments, progress of various government works etc. can be obtained at home. As a result of this, the transparency of government activities has also increased and common people are also getting to know about various government facilities. For example, applying for a passport, submitting income tax returns can all be done very easily and quickly through the Internet. Also, various government agencies are able to coordinate their activities more by sharing information with each other through the Internet.

7.5.1 Downloading Information from Internet & using the same for the development of Children

Today's era is the era of information technology. Today the role of information in all aspects of life is immense. The advancement of information technology and the widespread use of the Internet have made information retrieval and its use very easy. Like other fields, the use of internet in education especially in child education and child development is very significant. A huge amount of information is at our fingertips today through the internet. Collecting information from this vast repository of information and using it at all levels of teaching and learning has made it possible to easily overcome the limitations of textbooks. As a result, it has become easier for the teacher to answer the various questions of the children's minds and to curb their curiosity about various subjects. And all of these play an important role in mental and character formation of a child. However, if the information collected from the internet is properly analyzed and served to the student with examples and appropriate. explanations, the content will become more understandable and it is the sole responsibility of a teacher.

Transferring the necessary information from the Internet to the user's computer is called downloading. All the information that is downloaded through the internet should be properly saved for future use. The method of downloading information from the Internet is briefly discussed below:

- First**,** Internet Explorer, Mozilla Firefox, Google Chrome or any such web browser should be opened.
- If you know the address of the website from which information is to be collected, type the address of that website in the address box of the web browser and press the Enter key or click the Go button. Only then the web site will be opened and the required information can be collected from there.
- If the exact address of the website or portal is not known, Google or any such search engine must be taken.

For example, suppose a user wants to know which teacher education institutes are recognized by the National Council for Teacher Education or NCTE in West Bengal. But the user doesn't know the web address. In this case, by opening a web browser, type the address of a search engine, say Google's address i.e. www.google.com and press Enter key; Google's home page will be opened. Type National Council for Teacher Education in the search box and click the google search button or press Enter key. Immediately a list will be appeared on the computer screen is containing the first entry as NCTE: National Council for Teacher Education along with its web address www.nete-india.org will appear. Clicking the mouse on this name will open the website of NCTE. Now, if you click on the

link “Recognized Institutes” from this website, this page of Recognized Institutions will open. On this web page, if you click on the “I Agree” link of the Recognized Institution’s List column included in the Eastern Regional Committee, you will see the List of Recognized Teacher Education Institutions (Eastern Region). The page will open. Here, if you click the mouse on West Bengal among the states included in the Eastern Region, another page will open with the names of Teacher Education Courses of D.EL.Ed., B.Ed., M.Ed., B.P.Ed and M.P.Ed of West Bengal. Now if you click on D.EL.Ed, you will get information regarding the name and recognition of NCTE recognized DELEd colleges in West Bengal.

7.5.2 Uses of Web in Teaching Learning System

The use of Web in education is not only popular but has become a necessity over many areas. The web has brought about a revolution in information gathering, information sharing and information using that has added a new dimension to teaching-learning. In other words, the qualitative and quantitative excellence has increased manifold as a result of the use of the web in teaching - learning. One of the most important features of the Web is its use of multimedia and hypertext. Multimedia in the presentation of information hypertext, hyperlinks and automatic search have made the web more multimedia dependent. As much as a subject is interesting to the student in the traditional book-based education system, when the same subject is presented through multimedia i.e. text, images, animation, sound, etc., it becomes much more interesting and acceptable to the students. The web is the only alternative in delivering that education to any person anywhere in the world.

Traditional lecture method teaching in schools, colleges or universities cannot fully meet the educational needs of students. Universal participation of students at all levels in this system is not universally feasible. A student can find useful information for his/her reading or research from the web, similarly the web may become very helpful as a medium of distance education. Distance education institutes can deliver the syllabus, notes, lectures etc. of their various courses to the students through their respective websites. If there is an e-learning system on the website of an educational institution, then students can participate in online lectures and web based training or WBT. Based on this system, virtual universities have been created in different countries of the world. In a virtual university, students do not need to physically attend a class. Off-campus teaching has changed into virtual teaching today with the combination of multimedia, hypermedia and information technology. In virtual class mutual exchange of opinions and action-reaction between teacher-student is possible very quickly.

Currently, teachers or students can use different OER or Open Educational Resources for their own needs, OER are different resources related to teaching, learning and research that are available from the web for free and can be used and shared as and when needed. In this context, it may be mentioned that the National Repository of Open Educational Resources or NROER created by the joint initiative of the Central Institute of Educational Technology (CIET), NCERT and the Human Resource Development Department of the Government of India was launched on 13th August 2013. This Repository contains resources on various subjects from primary to higher secondary level in the field of school education. Initially this information is available in English and Hindi. However, this resource will soon be available in various regional languages as well. Moreover, it is planned to create Repository at the state level as well which will be linked with the National Repository. The web address of NROER is www.nroer.in. Another important contribution of the web is the news group. News group is an Internet discussion

forum where members can exchange messages on any topic. There are thousands of newsgroups on technical and non-technical topics, where members can participate in discussions on any topic. Also, a member of the newsgroup can read or download articles on various topics and can also post his own articles. Through Newsgroup a member can not only acquire knowledge on various topics but also can give his opinion on various topics. One of the most popular applications of computer networking is the worldwide system known as USENET.

Teaching and learning activities that teachers can do using various web resources are-

(a) Curriculum development.

(b) Lesson planning.

(c) Constructing and implementing aspirations.

(d) Assessing.

(e) Instruction and Teaching.

7.5.3 Importance of e-mail in Communication and Teaching Learning System

E-mail or electronic mail is one of the most important and widely used Internet services. E-mail is an electronic message sent from one computer to another using the Internet. In more detail it can be said that through this e-mail service it is possible to exchange information of various types between person to person or person to organization or organization to person or organization to organization over the Internet. This information can be text, images, audio and video. Geographical distance is no barrier to e-mail exchange. No matter where the sender and receiver are in the world, the sender's message reaches the receiver very quickly. In this case, only the computer of the sender and recipient should be connected to the Internet and both should have an e-mail address. Advantages and disadvantages of using e-mail are described below.

Advantages of using e-mail:

(a) Sending information through e-mail is very easy and can be transmitted very quickly.

(b) The cost of sending e-mail is very low.

(c) It is immediately known whether the information sent has reached the recipient correctly, and if not, it can be re-sent.

(d) The recipient can read the letter and send a reply by opening his mail box wherever he is.

(e) Same message can be sent simultaneously to more than one person. In that case there is no need to write again and again, only the writing of e-mail address is required.

(f) E-mail messages are much more secure due to password protection. Anyone sitting on the computer can't open other's mail box.

(g) E-mails can be exchanged at any time of the day or night.

(h) An e-mail message can be sent as a text file, scanned paper, image or any audio or video attachment.

(j) The message is stored in the recipient's mailbox even if the recipient's computer is disconnected from the Internet. Therefore, while sending the mail, the sender does not have to worry whether the recipient is connected to the Internet at that moment or not.

(j) E-mails can be stored in the mail box (inbox) for a long time.

(k) Print out of any e-mail can be taken as and when required.

Disadvantages of using e-mail:

(a) It is almost impossible to send very large e-mail messages or large volumes **of** data as attachments.

(b) The speed of e-mail transmission may be very slow if there is a problem with the network system.

(c) User's computer is infected by various computer viruses while exchanging information through e-mail (affected) and may damage the computer system.

(d) If you do not log out of your e-mail account, someone else may use it for malicious purposes.

▸ Email Address

Sending or receiving e-mail requires a specific address or addresses, just as an address is required for sending general correspondence. This is called e-mail address or e-mail Id in short. There are many websites where e-mail Id can be generated, like www.yahoo.com, www.rediffmail.com etc. Using these websites one can generate e-mail Id free of cost. It is worth noting here that every letter of e-mail Id should be English lower case letter. The e-mail Id is a unique address i.e. more than one person cannot have the same e-mail Id. There are two parts of a complete e-mail Id, namely-

(i) User name and

(ii) Domain name

The above two sections are separated by '@' symbol. User name indicates the identity of the person or organization who is the sender or recipient of the mail. Username must start with a letter and can contain any number, period and some special characters, but no comma or space can be used in username. The domain name refers to the computer system where the user's account is. In other words it is the e-mail service provider identifier Id. For example say roy_abir 1975@rediffmail.com is an e-mail Id where roy_abir 1975 is the username, rediffmail.com is the domain name and com is the nature of the domain. Sometimes the domain name can be followed by a dot (.) followed by the country code, eg arka 2010@ yahoo.co.in/

▸ Buttons / Options used in E-mail

Below is an explanation of the buttons that will be visible on opening the e-mail page and what those buttons are used for:

- **New Message/Write/Compose:** To write a new mail, click on New Message/New Mail/Write Compose etc. from the menu or toolbar of the e-mail software, a window like the image below will open. Here the user can write the content of the mail as per his requirement.

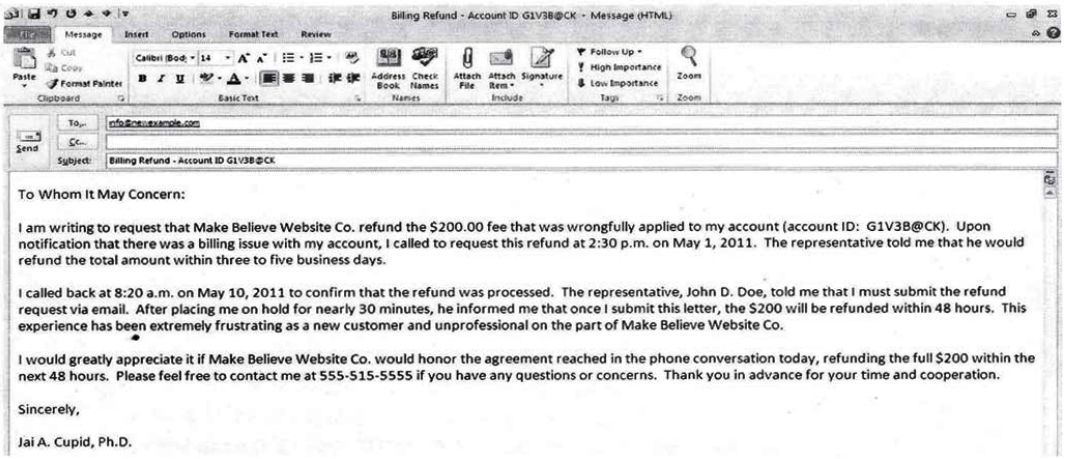


Fig. 7.4 E-mail page or window

- **TO:** Recipient's e-mail address is to be entered in this field.
- **CC:** The whole word is Carbon Copy. To send a mail to multiple recipients, the main recipient's e-mail Id is written in the TO-box and the e-mail Ids of the rest are written in the CC-**box** separated by commas.
- **BCC:** The full word of this word is Blind Carbon Copy. Here also multiple recipient e-mail Id is written with a comma. But while in CC the recipient can see the addresses of other people who have **sent** the same e-mail, but in BCC the recipient can see only his own mail address.
- **Subject:** In this cell, the content of the e-mail message is briefly written.
- **Attachment:** If any other text file, image, scanned document etc. is attached to the e-mail and sent to him attachment is called and use the Attachment Option to send such an attachment is sent.
- **Send:** Clicking this button after writing the mail sends the e-mail to the recipient's address.
- **Inbox:** All the mails received by a recipient are stored in this place in the form of a list or lists.
- **Outbox :** If the internet connection is disconnected for some reason at the time of sending an e-mail, it is deposited in the outbox is Mails are re-sent from outbox when internet connection is up.
- **Sent Item:** A copy of all the mails sent to the recipient is deposited in this box.
- **Trash:** All e-mails deleted from Inbox, Outbox or Sent Item are stored in this box. These mails if needed Can be recovered from Trash.
- **Reply:** If you need to reply to an e-mail, then open that mail from the inbox and click on the Reply button to get a space to write the reply with that mail. Then type the answer and click the send button to mail the answer goes to recipient.
- **Forward:** Open an email when you need to send it to someone else in the same state as it arrived. Click on the Forward button. Then enter recipient's e-mail Id in 'To' field and click on send button, the mail will be forwarded to the recipient's address.

▸ Process of Sending E-mail:

The sequential steps of sending e-mail through the Internet are—

(a) The computer must be connected to the Internet.

(b) Open certain browsers like Google Chrome or Internet Explorer or Mozilla Firebox.

(c) In the address box of the browser (Address box) write the specific website, let's say WWW.gmail.com and press Enter.

(d) Now enter the e-mail Id in the first blank text box of the previous image and the valid password in the blank box below and click on the sign in button to open the **e-**mail **account**.

(e) Then click on the COMPOSE button on the resulting screen.

(f) Enter recipient's e-mail Id in TO field here. If you want to send a copy of the same mail to another person, enter their e-mail Ids in the CC and BCC fields. Then type the subject of the letter in the subject field below and the description of the letter in the blank space below.

(g) If you want to attach a file to the e-mail, click on the Attachment button and select the file to be attached from the Choose File dialog box. Gmail will automatically start uploading the file and when the upload is complete, the name of the file will appear in the text box below.

(h) After clicking on the send button below, the e-mail will reach the recipient.

Reading Email :

To read an email follow the steps below:

(a) Login to the e-mail account with the help of e-mail Id and Password and click on Inbox. A list of mails stored in Inbox will appear.

(b) Clicking on the mail to be viewed will open the mail. If there is any attachment with this mail, then it will appear to the left of the mail header in the form of a paper clip.

▸ Role of e-mail in teaching-learning system:

The importance of e-mail in teaching-learning process is very high. It is described in below-

(a) Information required for teaching learning can be collected through e-mail. Requesting the necessary information by sending an e-mail to the information provider can send it through e-mail.

(b) Research findings can be shared.

(c) Through e-mail, teachers and students can discuss any topic outside the classroom at any time.

(d) If the student faces any problem in reading, he/she can contact the teacher through e-mail to report the problem and get the solution of the problem in the e-mail received from the teacher.

(e) Students can get new direction regarding their research by establishing e-mail communication with professors of different universities abroad.

(f) Students can become more active and constructive in learning through internet and e-mail.

(g) Barriers that do not exist in Internet and e-mail education are class size, pace of student learning, timed lessons in the classroom, lack of required information, etc.

7.5.4 Creating Password for Net Work Security

The use of passwords is considered to be the most effective way to properly protect information on all computers on a network. Passwords of individuals or organizations on the network are very important to prevent any other person or organization from collecting, destroying or misusing the information of an individual or organization without permission. Keeping the personal information of its clients secure is of utmost importance to any organization. There is no substitute for password protection when sharing information over a network. A password is a security system where a special code ensures the security of a data store. That is, in this case, if you want to access the database, you have to unlock it using the specific code by which the database is locked. Only valid user will know this code or password. All users who have e-mail, Facebook etc. accounts have a password to access their accounts. When an ATM card user withdraws money from his account using the ATM card he has to input a PIN (Personal Identification Number) which is a password. If this password is correct then the person is allowed to withdraw money from the account. Any other unscrupulous person knowing this password code can withdraw money from the ATM card holder's account and make him destitute. So the importance of having the right password and keeping it secure is immense. Depending on what type of code is used as a password, passwords can be divided into two categories, such as weak password strong password!

▸ **Weak Password:** All passwords that can be easily guessed are called weak passwords. Using this type of password, the security of any sensitive information cannot be guaranteed. Many people write down their passwords because they can't remember them. As a result all these passwords have the possibility of falling into other hands, which is why such passwords are also classified as weak passwords. Many users use family name, date of birth etc. as passwords to remember. But in this case, it is necessary to know that all the dishonest people or organizations who work to break this password keep all the personal information of the user in their database. So this type of password also falls in the weaker category.

▸ **Strong Password:** Passwords that have a large number of characters and are difficult to guess, i.e. passwords that use complex signals are called strong passwords. Cracking such passwords is difficult and time-consuming due to their long length and complex signals. In general, the characteristics that a strong password needs to have are—

(a) Length preferably at least 4 to 15 characters.

(b) Such passwords consist of upper and lower case letters, numbers (0-9) and special characters!, @, #. S, %, etc.) can be made in combination.

(c) The password must use something known only to the user, not any personal information.

(d) The password should not contain any consecutive alphabets or numbers.

(e) The password must be something that cannot be disclosed to anyone else.

(f) Passwords must use something that can never be written down directly anywhere.

7.6 Summary

- The World Wide Web (WWW) is the architectural frame work for accessing information from millions of computers connected to the Internet. Its father is Halen Tim Banners Lee.
- A system when two or more machines are connected together to establish mutual connections and exchange information is called a network.
- When the network is connected through gateways and facilitates global communication services, then that system is called Internet work or Internet for short.
- A browser is a special type of software program that makes it easy to search for information over the Internet can be done Some popular web browsers are Internet Explorer, Mozilla Fire Fox etc.
- A search engine is a tool used to search the WWW. Some of the popular search engines are Google, MSN, Yahoo etc.
- Email is an electronic message sent from one computer to another using the Internet. A complete e- mail Id consists of two parts, i.e. username and domain.
- Password is a security system where the security of information is ensured by means of special codes. Passwords can be divided into two types depending on the type of code used in the password. These are weak password and strong password.

7.7 Unit End Exercises

1) What does WWW mean?
2) Mention the advantages of WWW.
3) Write how search engines work.
4) What is meant by browsing?
5) What are the hardware and software required for internet service?
6) Discuss the uses of internet.
7) Describe the method of downloading information through internet.
8) Discuss in detail the use of web in education and learning.
9) What is e-mail? Mention the various advantages of e-mail.
10) What is an e-mail address? Discuss with examples.
11) Write about the importance of e-mail in teaching learning.
12) Discuss the role of passwords in network security.
13) Write the complete form:

    WWW, TCP/IP, ISP, DNS, HTML, HTTP, E-mail, URL, FTP, SMTP POP
14) Write a short note on:

    Internet History, URL, E-mail, Domain Name, Web Browser.

Project Work:

(1) Browse the website of West Bengal Board of Primary Education and download the syllabus of D.EL.Ed from there.

(2) Browse the web site of State Council of Educational Research and Training, West Bengal and collect information about D.I.E.Ts in West Bengal (e.g. number of DILE.TS, location, infrastructure, activities etc.).

(3) Create an e-mail account.

(4) Send mail with an attachment to a friend from own e-mail account.

(5) Search a favorite image from the Internet and download it to the computer. .

UNIT 8

Computer Protection

8.1 Introduction

Computer protection, also known as computer security or cybersecurity, is the process of self safeguarding computer systems, networks, and data from unauthorized, accses, theft, damage and interruption.

8.2 Objectives of the Unit

After reading of this unit learners will be able to-

- Understand what a computer virus is and how it damages a computer.
- Learn about the various characteristics of computer viruses.
- Define What is firewall, its types and use of firewall.
- Understand how antivirus works for computer security.

8.3 Concept of Virus in Computer

A computer virus is a type of malicious software or program that attacks a computer in any way to destroy data and other files stored in computer memory and disrupts the functioning of the computer. Not only that, its destructive activity can gradually increase and cause huge financial losses by changing important computer files, databases or accounting records kept on the computer. The various ways in which a virus can attack a computer are-

- Opening a virus infected file.
- Running a virus-infected program on a machine.

- Using virus-infected copies, CDs or pen drives etc. on the machine.
- Sometimes pirated software and viruses can be a means of attack.
- Virus attacks can occur on computers via the Internet or email.
- Email attachments are the easiest way to spread computer viruses.

Computer viruses were first conceptualized by David Gerroldi, although John Brunner provided detailed information about viruses. In his book he called the virus as Warm. In 1983 University of Cincinnati professor Fred Cohen created the first computer virus.

‣ Different Types of Computer Virus.

Computer viruses are divided into several categories according to their capabilities and attack sites. These are highlighted below.

Boot Sector Virus (Boot Virus): This virus attacks the boot sector and the information required to boot the computer causes distortion.

Partition Table Virus: This type of virus attacks the partition table sector. These viruses become active. during booting of computer.

File Virus: These types of viruses usually attack .com and .exe files. When any file of these types is executed the virus becomes active.

Multi Paratite Virus: This type of virus attacks files and boot sector together.

Macro Virus: This type of virus is usually contained in documents.

‣ Characteristics of Viruses

The characteristics of computer viruses are explained below:

Capacity to reproduce automatically

After a virus attacks the computer from outside, the primary function of the virus is to create a large number of copies of itself and spread them within the computer. Computer viruses are often found in operating system files causes infection and the computer itself starts getting infected whenever the operating system is started.

Migrate towards other Computers

If any data, CD, pen drive, floppy, external hard disk etc. from one computer is used in another computer; the solo virus of the information is copied to other computers. On the other hand, viruses are transmitted through LAN, WAN, Internet.

Resistance to vaccines

Viruses usually reside in computer memory or become a resident of the computer system to protect themselves from antiviruses. Therefore, even if the virus copies of various files or documents can be removed by the antivirus, the computer remains infected.

Destruction or harmful actions

A computer becomes uncontrollably harmful after being infected with a virus. Like ever computer hangs, deletes important data, corrupts data, freezes printers, disrupts normal CPU performance etc.

8.4 Firewall Protection in Computer

A firewall is a modern technical version of an old medieval security system, i.e. a moat between castles. Each palace has to be crossed over a bridge to enter and exit, and security or police check each entry and exit. The same approach can be followed for computers and networks. Let's say a company is connected to a LAN and traffic to and from that company must go through a security or electronic bridge. In this case, the electronic bridge is the firewall. So it can be said that firewall is a private network protection device that verifies the access of information located on a computer or when sending information to the global network. Using a firewall keeps your network secure, because the firewall controls the flow of data or information. This is why firewalls are a popular network security system today.

As per the above concept firewall has two components - Filter and Application Gateway

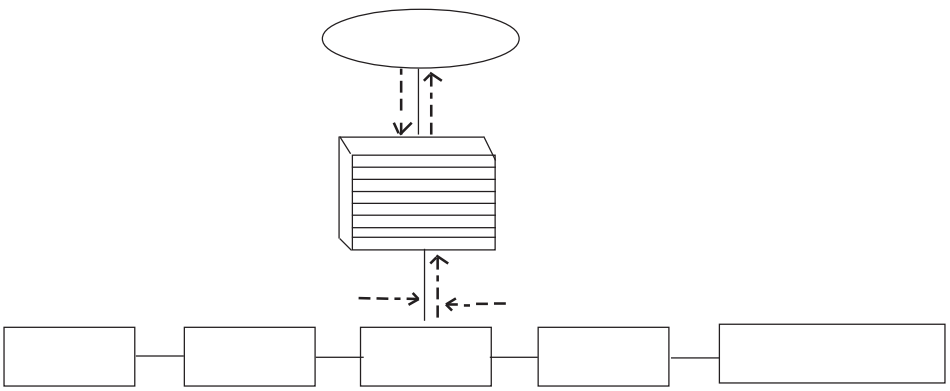


Fig. 8.1 Firewall protection

The figure below shows the internal structure of the firewall and its functionality.

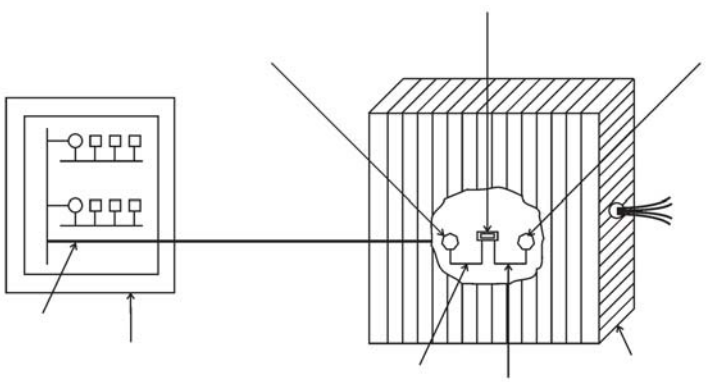


Fig. 8.2 Internal structure of firewall

There are generally three types of firewalls-packet label firewalls, application level firewalls, and circle label firewalls. These are described below.

(a) Packet Label Firewall: The main function of packet level firewall is to filter the data packets. transported (incoming and outgoing) from one network to another network to see if they can reach the destination network according to the security policy. Eg-check point firewall is a packet level firewall.

(b) Application Level Firewall: This type of firewall can analyze and filter application presentation data. For example, it can be said that the application gateway or firewall decides whether to send the message based on the action taken by analyzing the header field, message shape, subject etc. of the incoming or outgoing message on a mobile. Web proxy, mail server are examples of application level firewall.

(c) Circuit Level Firewall: This type of firewall is similar to application level firewall. Circuit Level Firewall checks a network once it is connected and does not check data a second time once it is connected according to security rules. This type of firewall is known as circuit level firewall as it checks the security of the network through which data or information is exchanged.

▸ Advantages and Disadvantages of using Firewall

The advantages and disadvantages of using firewall are described below.

Advantages:

- Internal i.e. private networks can be protected using firewalls.
- Sensitive, critical systems can be controlled and protected using firewalls.
- It is also possible to keep statistics of network users using firewalls.

Disadvantages:

- Because of the complexity of replacing firewalls within the network i.e. configuration, except for skilled people, Firewalls cannot be replaced.
- Despite the real benefits of using firewalls, small organizations do not use them because they are too expensive.
- Firewalls have limitations in being known i.e. they are not universally known, hence widely used

8.5 Uses of Anti Virus for Security

The first antiviruses were used only to remove viruses from the computer, but today various antiviruses, apart from computer viruses, create a resistance against worms, phishing attacks, rootkits, etc. and remove them from the computer. helps to In this context, it should be noted that it is not only necessary to use antivirus, it must be updated constantly through the Internet. Updating increases the power of the antivirus and maintains its normal functionality. Antivirus can detect viruses through some methods. They are recorded below.

Signature Based Detection

This method has the highest virus detection. This viral signature is called viral code. If this viral code is found while scanning a file, the antivirus takes necessary action by completing the detection task mainly in three steps. These steps are Quarantining, Repairing and Deleting.

First, the antivirus makes the file inaccessible. Quarantine's job is to encrypt the file. If the user wants to save the virus infected file, the antivirus tries to repair the file. If not repaired, the antivirus deletes the file and thus prevents against virus attacks.

Heuristic Based Detection

In heuristic based detection, viruses are detected by two methods, viz.-file analysis and file emulation. In file analysis, the antivirus analyzes the instructions contained in a program and based on the analysis. can tell whether the program is infected with a virus. In the file emulation method, the file is first run in a virtual system environment and the activity of the file is monitored. A file is marked as a virus if its instructions appear to be malicious.

Behavioral Based Detection

All types of programs are monitored in this manner. If a program tries to write data into an executable program, the antivirus identifies the program as a virus. Beside this using data mining techniques antiviruses can detect Viruses.

'Prevention is better than cure' this is a common proverb. This applies equally to computers, so precautions should be taken before a virus attack occurs. There are various types of Antivirus software available in the market; some of them are Norton, Netwhield, Quick Heal, Avast etc. These softwares must be installed and updated regularly through the Internet. Here are some things to keep in mind:

- If using a new floppy disk, pen drive, it must first be scanned on the computer.
- Be cautious when opening information from an unknown source.
- Antivirus should be run every day after opening the internet.

Computer system data can be secured through the above methods.

8.6 Summary

- A virus is a software program code that infects and damages a computer and in many cases destroys it completely. David Gerroldi gave the first idea of the first.
- The main features of viruses are automatic replication, transmission from one computer to another, prevent protection and uncontrollably damage computers.
- Firewall is a private network protection system to prevent unwanted information from entering into the computer or to check it if is sending to global network.
- Antivirus is a software program that helps to keep computers free from viruses.

8.7 Unit End Exercises

(1) What is a virus? Viruses can be classified according to their potency and site of attack?

(2) Write the characteristics of viruses.

(3) What is antivirus? Describe the functions of antivirus.

(4) What is firewall? Explain with picture how firewall works.

Project Work

(1) Scan any of the computers from the computer lab and a removable drive using antivirus software.