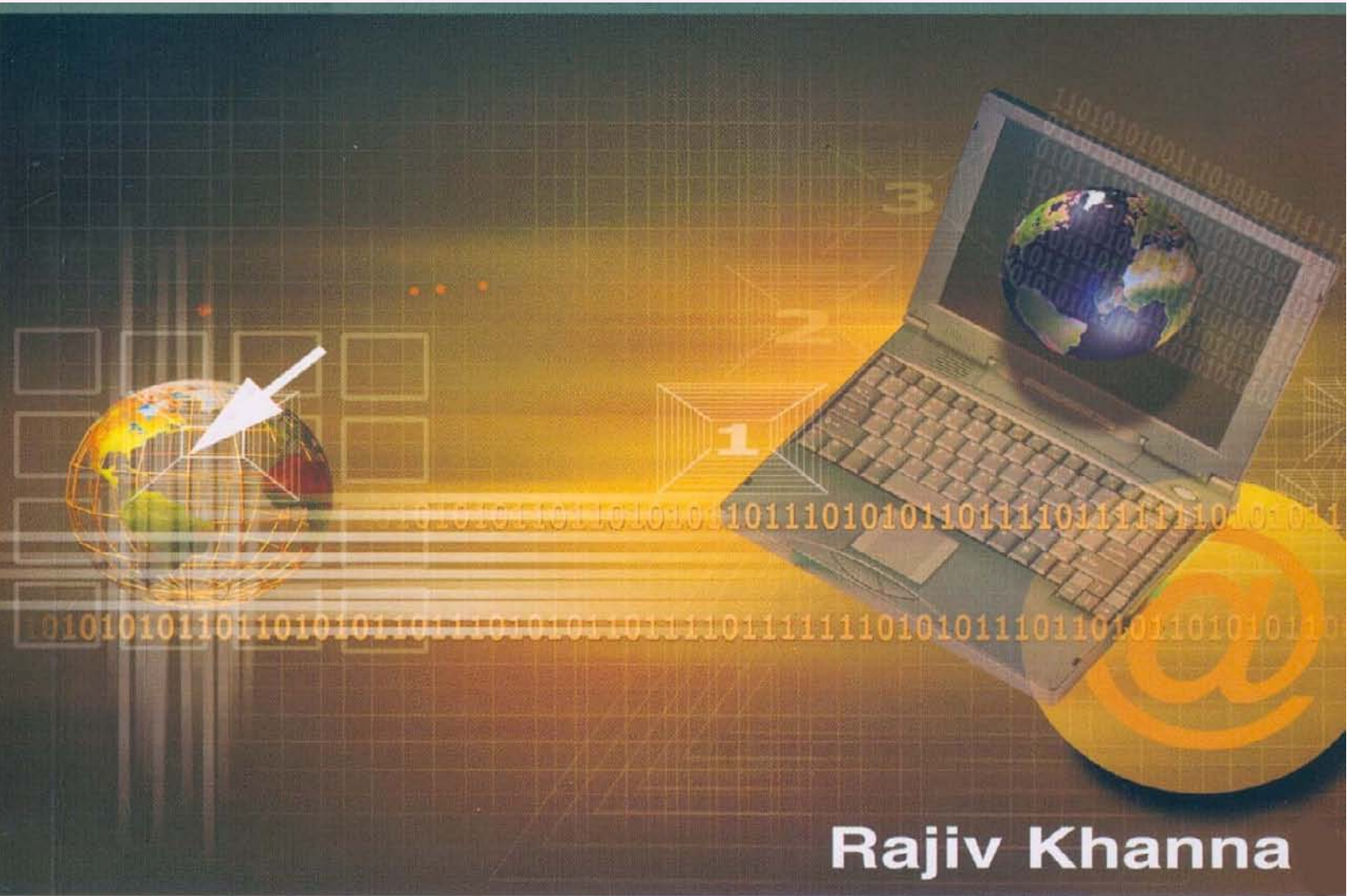


NEW AGE

# Basics of Computer Science



**Rajiv Khanna**



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# **Basics of Computer Science**

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# Basics of Computer Science

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**Includes  
Solution For Lab Assignment  
&  
Viva Question Bank**

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**Rajiv Khanna**  
Technical Director  
Bell Infotech Systems (P) Ltd.



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# Table Of Contents

---

## PART I

*(Computer Application Theory)*

<b>1</b>	<b>□ Introduction To Computer .....</b>	<b>1</b>
	History Of Computer .....	1
	Generations Of Computer .....	7
	□ First Generation Computers .....	7
	□ Second Generation Computers .....	7
	□ Third Generation Computers .....	8
	□ Fourth Generation Computers .....	8
	□ Fifth Generation Computers .....	9
	Classification Of Computers .....	9
	□ Analog Computers .....	10
	□ Digital Computers .....	10
	□ Hybrid Computers .....	10
	Types Of Computers .....	11
	□ Microcomputers .....	11
	● Personal Computers (PC) .....	11
	● Laptop Computers .....	11
	● Tablet PCs .....	12
	● Personal Digital Assistants (PDA) .....	12
	□ Minicomputers .....	12
	□ Mainframes .....	13
	□ Supercomputers .....	13
	Parts Of A Computer System .....	14
	□ Hardware .....	14
	□ Software .....	14

---

---

•	System Software .....	15
•	Application Software .....	15
□	Firmware.....	16
□	Data.....	16
□	Information .....	17
□	User.....	17
	Computer Program .....	17
	Summary .....	18
	Exercises .....	19
<b>2</b>	<b>□ Computer Organization .....</b>	<b>23</b>
	Basic Components Of Digital Computer .....	23
	Input Units .....	24
□	Keyboard.....	24
□	Mouse .....	26
□	CD-ROM Drive .....	27
□	Other Input Units Of Computer .....	27
	Output Unit .....	27
□	VDU.....	28
□	Printer .....	28
□	Other Input Units Of Computer .....	29
	Input/Output Units .....	29
□	Floppy Drive.....	29
□	Hard Disk.....	30
□	CD-Writer .....	30
□	Magnetic Tape Drive .....	31
□	Magnetic Cartridge Tape Drive .....	32
	Central Processing Unit .....	32
	Memory.....	32
□	Arithmetic & Logic Unit - ALU .....	33

---



---

□	Control Unit .....	34
	Characteristics Of Computer.....	34
	Summary .....	34
	Exercises .....	36
<b>3</b>	<b>□ Operating System .....</b>	<b>39</b>
	Introduction.....	39
	Operating System Basics .....	39
	Major Features Of Operating System .....	39
	□ Management Functions Of Operating System.....	40
	□ Services Provided By Operating System .....	41
	□ User Interface.....	41
	• Command Line Interface .....	41
	• Graphical User Interface.....	42
	Most Desirable Characteristics Of Operating System .....	45
	Most Desired Advanced Features In Modern Operating Systems .....	48
	Types Of Operating Systems .....	49
	□ Single User Operating System.....	49
	□ Multi-User Operating System.....	50
	□ Network Operating System.....	50
	PC Operating System - DOS.....	50
	Windows Operating System .....	58
	□ Windows-9X.....	61
	□ Windows XP.....	61
	□ Windows-NT .....	62
	□ Windows NT Server .....	63
	□ Windows-NT Workstation.....	63
	□ Windows-2000.....	63
	Linux .....	64
	What Is Booting? .....	66

---

---

	What Is Shutdown? .....	66
	Summary .....	66
	Exercises .....	67
<b>4</b>	<b>□ Computer Communication .....</b>	<b>71</b>
	Introduction.....	71
	Introduction To Network .....	71
	What Is Computer Network.....	72
	Reasons For Networking .....	72
	Applications Of Network.....	75
	Benefits Of Networking.....	77
	Types Of Networks.....	78
	□ Local Area Network.....	78
	□ Wide Area Networks .....	78
	□ Variations Of LAN And WAN.....	79
	Network Topologies .....	79
	□ Bus Topology.....	80
	□ Ring Topology .....	80
	□ Star Topology .....	81
	□ Mesh Topology.....	82
	Networking Basics.....	82
	Modes Of Computing .....	86
	□ Peer To Peer Model .....	86
	□ Client Server Model.....	87
	Common Network Services .....	87
	Coordinating Data Communication (OSI Model) .....	90
	Data Transmission .....	92
	□ Forms Of Data Transmission.....	92
	● Analog Transmission .....	92
	● Digital Transmission.....	93

---

---

Damping.....	94
❑ Modem.....	94
Data Transformation.....	95
Transmission Techniques.....	98
❑ Asynchronous Transmission.....	99
❑ Synchronous Transmission.....	99
Modes Of Transmission.....	99
❑ Simplex Mode.....	100
❑ Half Duplex Mode.....	100
❑ Full Duplex Mode.....	100
Parallel Transmission.....	100
Serial Transmission.....	100
Internet.....	101
Classification Of Internet Computers .....	101
Identification Of Computers On Internet.....	102
History Of Internet.....	102
Understanding World Wide Web.....	103
Communication Protocols.....	105
❑ TCP/IP .....	105
❑ IPX/SPX Protocol.....	106
❑ Net Bios/NETBEUI.....	106
❑ Hyper Text Transfer Protocol (HTTP) .....	106
Internet Uses .....	107
Future Of Internet .....	108
Popular Use Of Web.....	109
Other Services Of Web.....	116
Summary.....	117
Exercises .....	120

---

---

## **PART II**

### ***(Computer Application Laboratory)***

<b>5</b>	<input type="checkbox"/>	<b>Windows</b> <i>(Theoretical Aspects)</i> .....	<b>127-131</b>
		Guidelines for completing Windows assignments .....	132-146
<b>6</b>	<input type="checkbox"/>	<b>MS-Word</b> <i>(Theoretical Aspects)</i> .....	<b>147-169</b>
		Guidelines for completing MS-Word assignments .....	169-172
<b>7</b>	<input type="checkbox"/>	<b>MS-Excel</b> <i>(Theoretical Aspects)</i> .....	<b>173-207</b>
		Guidelines for completing MS-Excel assignments .....	207-212
<b>8</b>	<input type="checkbox"/>	<b>MS-PowerPoint</b> <i>(Theoretical Aspects)</i> .....	<b>213-224</b>
		Guidelines for completing MS-PowerPoint assignments .....	225-226
<b>9</b>	<input type="checkbox"/>	<b>Internet</b> <i>(Theoretical Aspects)</i> .....	<b>227-228</b>
		Guidelines for completing Internet assignments .....	228-236

## **PART III**

### ***(Computer Application Viva)***

<b>10</b>	<input type="checkbox"/>	<b>Viva Question Bank</b> .....	<b>239-254</b>
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## PART I

# Computer Application Theory

**Includes theory and exercises for  
examinations**

- Introduction to Computer
- Computer Organization
- Operating System
- Computer Communication

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# Computer Application Theory

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## CHAPTER

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# 1

### *Introduction To Computer*

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Calculations have always been part of man's life. Be it his personal life or professional work in office, he has to perform calculations. Without calculations he cannot lead a normal life.

It has always been man's desire to perform all the calculations correctly, effortlessly and at very fast speed. For this, he has been continuously evolving new mechanisms and building better tools for calculations.

Ever since ancient time, a technological race has been set up between the complexity of the problems and calculation capabilities of calculating devices.

In this race both the runners have tried their best to stay ahead of each other. Whenever complexity of the calculations takes stride, a machine with more capabilities and power comes into existence. But at the same time, with the advent of new machines, complexity grows multi fold to place new challenges before the machine.

Thus in this race, many calculating devices came into existence and became obsolete, within short period of time.

The race has not yet finished, but to meet the challenges of contemporary complexity, computer in its most powerful form is available for use. There is hardly any sphere of life left today, in which computers are not being used. But unattended complexities are still demanding for more capable machines.

In this chapter, we will take a close look on the development of computer, which has taken place over past so many years.

#### **HISTORY OF COMPUTER**

Computers of today are quite powerful, sophisticated and very fast. They were not so in their earlier stages. In fact they have traveled a long distance from primitiveness to sophistication. They took many years to reach the present stage.

Ancient people used pebbles for counting and made scratches on the wall to keep track of their belongings. For example, ten scratches on the wall represented ten goats that they had. After that two new scratches nearby used to be clear indication of two new additions made in the fleet.

As they became bit wise, they made use of the objects nearby them and made counting and calculating devices. For example, long time ago they collected wires, wood and beads from here and there and made the first counting device, called Abacus. As the time passed, many computing devices got developed. After lot of advancements and improvements calculating devices reached the stage of modern computer. Ever since the birth of abacus, calculating devices have been making continuous progress. A brief historic development of these devices is given below.

### Abacus

Around 1000 years before the birth of Jesus Christ the Mesopotamians quite unknowingly laid the foundation of computer era. They made a device of stones sand and pebbles, called Abacus. It was mainly used for counting.

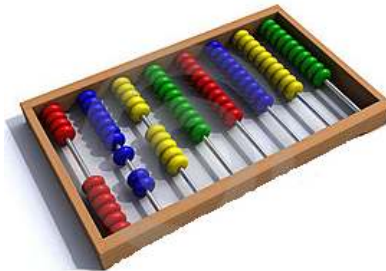


Figure 1.1

Later reforms were made in Abacus. Straight wires were fixed in a wooden frame and small beads were put in the wires. Beads could be moved along the length of the wire. Mathematical calculations like addition, subtraction, multiplication and division could be performed using new Abacus. Abacus is shown in figure 1.1.

Abacus is still being used today. Children are taught counting, using Abacus in schools. Many shopkeepers in Asia and “Chinatown” in North America, still make use of it for calculating the total payable amount for the articles sold by them.

### Napier's Bones

John Napier was a Scottish mathematician who lived from 1550 to 1670. He worked for more than 20 years to develop the theory of tables, which became quite famous, with the name Logarithmic Tables.

Towards the end of his life, John Napier devised set of rods, called Bones, because they were constituted from bones. Digits were printed on them. Napier's rods essentially transformed the process of complex multiplication and division into much simpler tasks of addition and subtraction.



Figure 1.2

Napier's Bones are shown in figure 1.2. Refer this figure and note that each rod contains ten squares. The first square has the serial number of the rod written in it. Remaining nine squares are bisected by a diagonal, leaving aside the first square. The n<sup>th</sup> square in it contains the result of multiplication of rod number by n. So that the upper triangle of the square contains the most significant figure and the lowest triangle contains the least significance figure. For example, the third square in fifth rod will have 15 in it.



Now let's multiply  $786 \times 3$ . The 3<sup>rd</sup> square in 6<sup>th</sup> rod contains 18. So 18 will be at unit place of the product. Similarly, third square of the 8<sup>th</sup> rod contains 24. Thus 24 will be at 10<sup>th</sup> position. Third square of 7<sup>th</sup> rod contains 21. Thus 21 will be at 100<sup>th</sup> position. Thus we get:

$$\begin{array}{r} 7 \times 3 = 21 \\ 8 \times 3 = 24 \\ 6 \times 3 = 18 \\ \hline 2358 \end{array}$$

$\swarrow$  unit  
 $\swarrow$  10<sup>th</sup>  
 $\swarrow$  100<sup>th</sup>  
 $\swarrow$  1000<sup>th</sup>

## Slide Rule

Slide rule was once-upon-a-time favorite mechanical device that was quite often used for performing complex and complicated calculations at very fast speed. Using slide rule mathematical, statistical and engineering calculations are performed with ease. For doing all these calculations, it makes use of logarithmic tables that were invented by John Napier in 1941.

The **slide rule** consists of a pair of finely divided fixed scales. Most often, outer pair of scales is fixed and inner scale is movable. A sliding window called cursor is put around the scales.

In slide rule, all the calculations are done by sliding the scales and the cursor. This is the reason why it drives its name slide rule.

Before the advent of pocket calculator, slide rules were quite popular. From 1950 to 1960, they were seen as the best available tool for calculations. When computers became popular and pocket calculator became cheap, their use became limited.



Figure 1.3

## Pascal's Calculator

Blaise Pascal was a French mathematician, physicist and theologian. He was the son of tax collector. His father had to do lot of additions and subtractions, in which he quite often made errors.

At the age of 18 in the year 1642 Pascal started developing a mechanical device, using which arithmetic operations like addition and subtractions could be done very easily. The first operating model was introduced in 1642.

This machine was called Arithmetic Machine. Later Pascal created 50 more machines, over next 10 years.

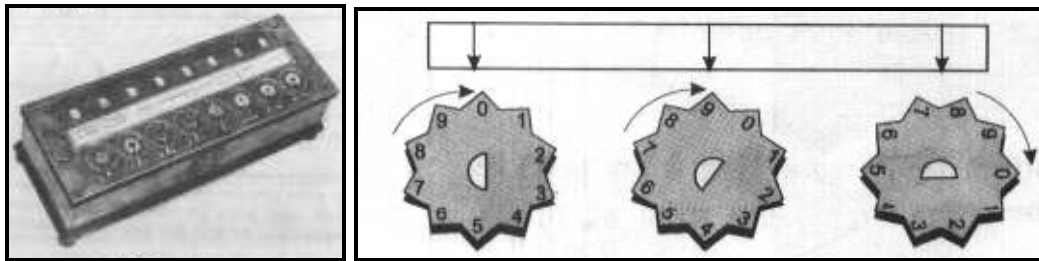
Later this machine was called, Pascal's Adding Machine. It is shown in figure 1.4.

Pascal's adding machine was built on a brass rectangular box where, a set of notched dials moved internal wheels, in such a way that a full rotation of a wheel caused the wheel, at the

left to rotate one tenth. Although the first prototype contained only 5 wheels but later, units with 6 and 8 wheels were also made.

The wheels of the machine moved only clock wise and were designed to perform additions. Subtraction was done by applying a cumbersome technique, based on addition of the nine's complement.

The biggest disadvantage of this machine was that operations like multiplication, division etc. could not be done through it.



**Figure 1.4**

### **Leibniz's Calculator**

A German mathematician, whose name was Gottfried Leibniz, improved the adding machine, developed by Pascal. This new machine, which he constructed in year 1671, was able to multiply and divide as well. The concept of multiplication was to repeatedly add the same number to itself. Instead of using wheels in his machine, he used stepped-cylinders, each with nine teeth of varying lengths. Leibniz's Calculator is shown in figure 1.5.



**Figure 1.5**

### **Jacquard's Loom**

A French weaver Joseph Jacquard invented an automated loom in 1804. This loom used punched cards to produce patterns and designs on cloth. The weaving action of this machine was totally governed by the absence or presence of holes in the cards. In other words, you can say that the entire operation was under a program's control. With this, historic invention of punched cards, the era of storing and retrieving information started that greatly influenced the later inventions and advancements of computing devices.



**Figure 1.6**

## Babbage's Difference Engine

In year 1822, Charles Babbage, a professor of mathematics developed a machine called Difference Engine. This machine was able to calculate logarithms up to high precision degree. It had capability to calculate different functional values and could also calculate polynomials by finite difference technique.



Figure 1.7

## Babbage's Analytical Engine

Charles Babbage started working on a device named Analytical Engine in year 1833. This Analytical Engine was in real terms the ancestor of modern computer. The Analytical Engine was able to perform all four arithmetic operations. It was conceptualized around processor, storage area, memory and input/output devices. The two revolutionary inventions in Analytical Engine were comparison and modification of stored information. This was the first invention, which enabled machine to compare quantities and then decide which of the instruction sequence to follow. Due to lack of technology at that time, it was not possible for Babbage to build such an engine. Its design remained conceptual. His great invention of Difference Engine and Analytical Engine earned Charles Babbage the title Father of Modern Computers - a suitable tribute to him.

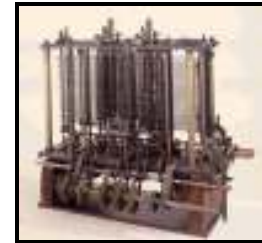


Figure 1.8

## Hollerith's Machine

The dream of Charles Babbage was fabricated by an American, named Herman Hollerith (1869-1926). In year 1887 he fabricated the first electromechanical punched card tabulator that used punched cards for input, output and instructions. This machine was used by American department of census to compile their 1880 census data and was able to complete compilation in 3 years, which earlier used to take around 10 years.

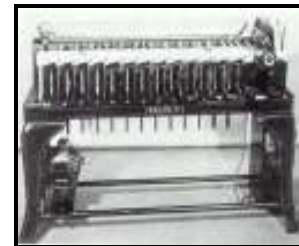


Figure 1.9

## Mark-1

Prof Howard Aiken (1900-1973) of U.S.A constructed an electromechanical computer named Mark-1 in year 1943. Mark-1 had capability to multiply two 10-digit numbers in 5 seconds, which was a record at that time. Mark-1 was the first machine, which could perform according to pre programmed instructions automatically without any manual interference. This was the first operational general-purpose computer.

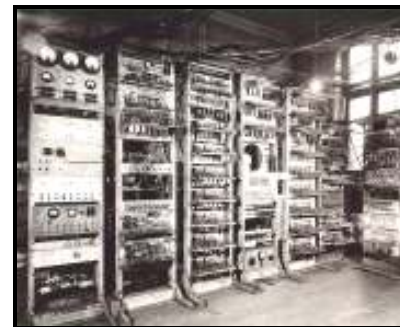


Figure 1.10

## ENIAC

The defense department of USA was supposed to design advanced weapons, missiles and aircrafts. For this, they had to do lot of complex calculations. This process was not only time consuming but was error prone also. To do this work efficiently, in 1946, scientists of Pennsylvania University designed a new computer.

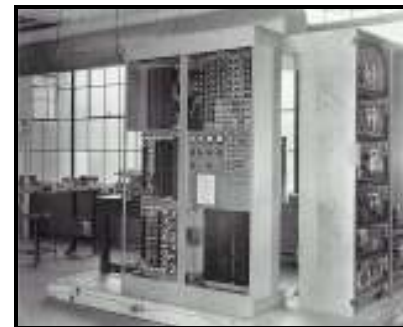
This computer was 20 feet long and 40 feet high. It consumed as much electric power as was sufficient to light a small city. But this machine was much faster than any earlier machine. It was capable of doing more than 5000 additions, subtractions or 350 multiplications and divisions in a second. This machine was called ENIAC. ENIAC is acronym for **Electronic Numerical Integrator and Computer**. The biggest problem with this computer was that all the instructions were hardwired within the computer. Thus making modifications in instructions was a very difficult task. This problem was removed from the computers, which came after this computer.



**Figure 1.11**

## EDVAC

EDVAC is acronym for **Electronic Discreet Variable Automatic Computer**. It was designed and created in 1950 in Moore school of America. It was capable of taking instructions from external resources. Data and instructions, both could be provided to it, using punched cards. Thus problem of hardwired instructions, which was there in ENIAC, was solved in this computer. Its performance was much better than earlier computers.



**Figure 1.12**

## Modern Computer

In the year 1981, IBM developed a modern computer. It was small in size but very powerful. Its functioning was very simple. This computer was called **Personal Computer** or **PC**. It became popular very soon. After 1981 lot of improvements were made in PC. These improvements made PC very powerful and easy to operate. Personal Computer's functioning has now become so simple that even a child can operate it.



**Figure 1.13**

## GENERATIONS OF COMPUTER

Computer being an electronic device, its size, capabilities and power at any time are greatly influenced by the existing state of electronics of that time.

If electronic components and devices of any time were big, slow and unreliable then computers of that time were also big, slow and unreliable. On the other hand fast, reliable and smaller electronic components made the computers small, reliable and fast in operations.

You know that technological developments of electronics passed through few major phases. For example, there was a time when vacuum tubes were quite popular. They were freely used in majority of electronic equipments. After some time, they were replaced by transistors. Later Integrated Circuits came and set a new path for electronic developments. Computers of specific electronic era are often referred to as a generation. Various generations of computer that came into existence, are described below.

### First Generation Computers (1942-1955)

First generation computers were voluminous in size. **They were made using vacuum tubes.** Vacuum tube was a fragile glass device that could control and amplify electronic signals.

First generation computers used the idea of execution of stored programs. Following were the main drawbacks of first generation computers:

1. Their size was very large.
2. Speed of instruction-execution was very slow.
3. They generated lot of heat.
4. Switching through vacuum tubes was not reliable.
5. Heavy air conditioning was required.
6. Only scientists and engineers were able to use these computers and that too in limited areas due to their high cost.
7. They needed a constant maintenance, which was very expensive.

Some of first generation computers are ENIAC, EDSAC and UNIVAC I etc.



Figure 1.14

### Second Generation Computers (1955-1964)

Transistor was invented as a smaller and more reliable successor of the vacuum tube. Although transistor was invented in 1948, its application in computers started in the year 1958. The transistor was more reliable, less expensive, and smaller than the smallest vacuum tube. It consumed very little power and produced much less heat.



Figure 1.15

A transistor is also called a solid-state device. It is made of a material whose principal part is silicon element. It is also called semiconductor device. It performs all the functions of a

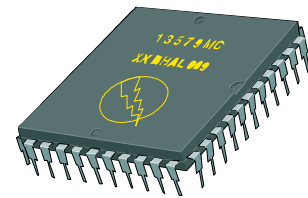
vacuum tube i.e. switches circuit on and off at a very high speed. **Second generation computer made use of transistors.**

Apart from the above listed advantages, the second generation computers used better devices such as card readers, printers etc. This generation is also important from the point of view of language development and use. First generation computers used machine level language or low-level language i.e. program was written directly in binary digits, which was very cumbersome and tedious. Later the development of Assembly Language helped the programmers to some extent. The high level language FORTRAN was also developed for this generation of computers. This development brought the computers very close to man and made it a very popular machine. Some of the names of second generation computers are IBM series, UNIVAC III, CDC 1400 series, Honeywell etc.

### **Third Generation Computers (1964-75)**

The development of integrated circuit was another milestone in the history of computer science. It was micro electronic technology, in which it was possible to integrate large number of circuit elements into very small surface area (less than 5 mm square) of silicon known as Chip. This generation was based on Integrated Circuits (IC) technology and the **computers that were designed with the use of integrated circuits were called third generation computers.**

These computers had better storage devices and improved input / output devices, such as Visual Display Unit (VDU), Magnetic Ink Character Reader (MICR) and high-speed line printers. These computers were 10,000 times faster than the first generation computers and arithmetic and logical operations could be performed in nano seconds (1 nano second= $10^{-9}$  seconds). It was this time, around which major advancement in the field of hardware as well as software took place. Many useful high-level languages were developed. These computers used operating system. The use of faster input and output devices enhanced the capabilities of these computers and made multi-programming possible, in which a number of programs could be executed simultaneously by a single processor. Some of the popular computers of this generation are IBM 360 series, 370 series, UNIVAC, HOG 9000 series etc. Some of them are still in use.



**Figure 1.16**

### **Fourth Generation Computers (1975 Onwards)**

The development of microprocessor chip that contains entire central processing unit (CPU) on a single silicon chip led to the invention of fourth generation computers. The technology that was used in third generation computers in the form of Integrated Circuit (IC) was known as Small-Scale Integration (SSI). This IC contained about ten to twenty transistors on it. Later, the Medium Scale Integration (MSI) was developed, in which it was possible to assemble up to hundred transistors on a single chip.



**Figure 1.17**

After this, came the era of Large-Scale Integration (LSI) in which, it was possible to integrate 30,000 transistors on a single chip. Efforts were made and now the era of VLSI (Very Large Scale Integration) has come, in which millions of transistors can be assembled on single chip. **Current generation computers are fourth generation computers and are making use of VLSI chip.** This has made the size of current computer very small. Fourth generation of computers can be called microcomputer generation. The input/output devices used with fourth generation computers are quite advanced. These devices are optical readers, which can transfer the contents of CD within few microseconds to the computers. This generation's computers are compact, faster, and more reliable.

### Fifth Generation Computers

Till fourth generation computers, the main stress was on hardware technology. Though these computers are faster, more accurate, reliable, smaller in size and very cheap, still they lack thinking power. **The fifth generation computers will have thinking power and capability to make decisions like human beings,** and may prove better than man in certain aspects. They will be more useful in the field of knowledge processing rather than in data processing.

In fact fifth generation computers are dreams of Japanese scientists. They have started work in this direction few years ago. The concept of Artificial Intelligence (AI) is being used in these computers. These computers will have Knowledge Information Processing System (KIPS) rather than the present Data/Logic Information Processing System. Japan has chosen the PROLOG (Programming in logic) language as its operating software and plans to have the final machine, which will talk with human beings, see and deliver pictures and hear man's natural language.

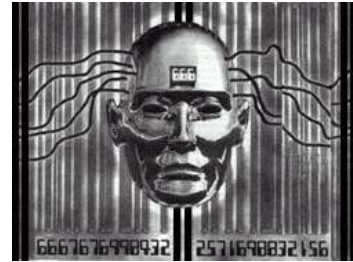


Figure 1.18

### CLASSIFICATION OF COMPUTERS

You know that the device, which computes is called computer. For computation, computer takes some input, performs computation on it and gives result.

The type of input that computer accepts, decides its nature and capabilities and the type of computation that it will be able to perform. For example, some of the computers accept input in the form of signals. On the other hand, majority of computers take input in the form of digits. Some computers accept input in both the forms i.e. in the form of digits and signals. On the basis of input type, computers have been classified into following three categories:

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

A brief description of all these types of computers is given below:

## Analog Computers

Let's first understand what is signal. Signals can be defined as continuous flow of physical identity. Temperature, pressure, water level, speed, voltage, current etc. are few examples of signals.

**Those computers, which operate upon signals** (by accepting temperature, pressure, speed etc. as input) **are called analog computers.** Speedometer, thermometer, barometer, voltmeter, ammeter etc. are few examples of analog computers.

To understand the concept of analog computers, let's take the example of speedometer, which is used in scooters and cars. It makes use of cable. One end of the cable remains in contact with the wheel of the vehicle. The other end of the cable is inserted in the speedometer. When the wheel rotates, cable also rotates. Cable's rotation is thus passed to the internal assembly of the speedometer, which in turn rotates the needle on a calibrated scale. Thus when the vehicle moves, its speed gets displayed on the speedometer's scale.

The slide rule is hand-operated analog computer for doing arithmetic operations like multiplication, division etc.

## Digital Computers

In computer terminology, alphabets, numbers, special characters etc. are called digits. Those computers, which accept digits (like name, age, e-mail address etc.) as input, are called digital computers. Computers that we see in offices, shops, hotels etc. are digital computers.

## Hybrid Computers

Those computers, which accept both types of inputs i.e. signals and digits are called hybrid computers. For example, computers placed in ICU (Intensive Care Unit) are examples of hybrid computers. They accept heartbeats of the patient (signals) as input. They also accept instructions that need to be carried out (digits). Similarly computers placed in atomic reactors (taking radioactivity level and instructions as input) and mines (which take carbon monoxide level and instructions as input) are other examples of hybrid computers.

Note that in this book, we will mainly deal with digital computers. All the aspects, explained now onwards would mainly apply to digital computers unless stated otherwise.



**Figure 1.19**



## TYPES OF COMPUTERS

Digital computers can be classified into various categories, on the basis of their sizes. When we say, size of the computer, it refers to multiple factors like, size of the memory, number of terminals that can be connected to the computer, storage capacity of the hard disk, type of processor used in the computer etc. Digital computers are generally classified into following categories:

1. Microcomputers
2. Mini computers
3. Mainframe computers
4. Supercomputers

### Micro Computers

Microcomputer is the smallest category of computers, in which single microchip is used for two basic units i.e. ALU and Control Unit. This microchip is often referred to as microprocessor. Microcomputers are further classified into following categories:

1. Personal computers
2. Laptop computers
3. Tablet PC
4. Personal Digital Assistant (PDA)

#### Personal Computers (PC)

Computers that you commonly see these days are examples of Personal Computers. In short, they are called PC. Their outward appearance is shown in figure 1.20. They mainly comprise of four units i.e. CPU box called chaises, keyboard, VDU and mouse. Only one person can work on them at a time, so they are called single user computer. Originally they were designed and manufactured by IBM. Later, as they became popular, other manufacturers also started manufacturing similar type of computers called IBM clones.



Figure 1.20

#### Laptop Computers

Laptop computers also fall into the category of microcomputers. They possess same capabilities and resources that of Personal Computers. A laptop is shown in figure 1.21.

In their outward appearance, Laptop computers look like a briefcase. Upper panel of the briefcase comprises of LCD screen. Lower panel contains keyboard and mouse arrangement. Other components and circuitry remain packed inside the briefcase. They are deliberately designed to be light in weight. They run on chargeable battery, which resides inside. Due to their size, weight and



Figure 1.21

independence from power (for two to three hours) people carry them while traveling in car, train or airplane and work on them.

### **Tablet PCs**

Tablet PC is the latest development in the field of computers. Its physical appearance is illustrated in figure 1.22. Note that it looks like laptop computer with many more enhancements and additional facilities packed, within same space.

Display system of Tablet PC, vertically rotates, by  $180^{\circ}$ . When rotated, it starts accepting input through a special light pen, called light pen. Whatever is written on Tablet PC's screen, with the pen, in natural handwriting, is taken as input. Thus writers need not write their articles on paper and then give it to typists to get its formatted copy. They can directly write the text on Tablet PC's screen, using light pen. Tablet PC will recognize their handwriting and save the document in predefined format, in desired font, as if typist typed it on computer. Similarly artists can now draw figures, directly on Tablet PC's screen and color them too. Light pens also have provision for removing written text or drawing lines, as if natural eraser was being used for making corrections.

Some of the Tablet PCs also accept voice input, through microphone. Whatever is spoken in front of them is converted into text file.



**Figure 1.22**

### **Personal Digital Assistants (PDA)**

Personal Digital Assistants are very small computers that fit within a palm. A PDA is illustrated in figure 1.23. They are often of the size of scientific calculator. This is the reason, why they are also called Palmtop computers. They are mostly used for storing addresses, telephone numbers, maintaining personal appointments etc. They can also be connected to higher range computers either through cable or wireless link, for the exchange of data and information.

### **Minicomputers**

Minicomputers are relatively larger and faster computers. Apart from single user environment, they also support multi user environment. They are generally used for automating those applications, which are large in size, require fast processing capabilities and demand for resource sharing among multiple users. Main characteristics of minicomputers are described below.

1. They are built, using high performance and high capability processors.
2. Memory size in such type of computers is generally very large.
3. They support multiple terminals, which may range from 2 to 16.



**Figure 1.23**

4. Large capacity disks are used in multiple numbers so that the data and programs of all the users could be put on-line.
5. They provide facility to connect multiple printers.
6. They possess the capability of performing computer network related major operations.

## Mainframes

Mainframes fall into next higher category of computers. Their internal architecture and circuitry remains different from minicomputers. They use specially designed proprietary circuits instead of just single microprocessor as their CPU. Their circuitry promotes higher connectivity, faster throughputs and large data processing capabilities.

Due to proprietary circuitry, mainframes become quite big in size and provide facility for connecting minicomputers and microcomputers with them. Few characteristics of mainframes are listed below.

1. They possess the capability of addressing larger memory sizes than that of minicomputers.
2. They also support larger capacity disks like optical disks etc.
3. Their terminal connectivity can go as high as 256 or beyond.
4. They possess large number of application libraries that provide great help to developers in developing useful applications.

DEC 20, IBM 370 etc. are the examples of few mainframes. IBM (USA) is the largest manufacturer of Mainframe computers.



Figure 1.24

## Supercomputers

Supercomputer is the largest category of computers. They use multiple CPUs for processing the data and executing the instructions. While performing a task through Supercomputer, the complete task gets divided into multiple independent tasks. Each CPU takes up individual task and completes it in parallel. This methodology of processing is called parallel processing.

Due to parallel processing, Supercomputers become capable of processing large volumes of data at very fast speed. They process multi million to few trillion commands per second. Applications like weather forecasting, nuclear weapon design, projection system modeling, aero modeling etc., which require tremendous processing capabilities, can be very well executed on Supercomputers. CRAY, XMP 24 and NEC 500 are few examples of Supercomputers.



Figure 1.25

## **PARTS OF A COMPUTER SYSTEM**

Computer and computer system are two different things. The word computer refers to that bare electronic device, which possesses computing power, using which wide variety of operations are performed, while computer system refers to group of items, which put together make computerization of an application possible. Computer system comprises of following five major parts:

1. Hardware
2. Software
3. Firmware
4. Data
5. User

A detailed description of all these parts of computer system is given below:

### **Hardware**

The physical part of computer system is referred to as hardware. All electronic and mechanical items that constitute computer system fall into the category of hardware. For example, keyboard, mouse, monitor, printer, processor etc. are hardware. Power and capabilities of hardware, directly govern the power of computer system. For example, weaker is hardware of PC in comparison to supercomputer so higher-end applications like aero modeling, weather forecasting etc. cannot be performed on it. On the other hand, all these applications become possible on supercomputer hardware because they are built using most powerful electronics.

### **Software**

Computer hardware is basically dumb equipment. Although it possesses computing power but it cannot compute on its own. It requires step-by-step instructions for computing. Without instructions it cannot compute.

Any instruction, which either makes hardware perform a task or ready for performing the task, is called software. For example, just by switching on the computer and pressing the keys of the keyboard, computer will not accept the data. Prior to that, it will require set of instructions, which would gear up the hardware internally, to accept the data. Thus all these instructions will be called software. Similarly after activating the computer, another set of instructions could be given to:

- Accept student's data
- Process the data
- Generate result sheet for each student and prepare merit list.

This set of instruction is also software.

Now just compare the results achieved by two different sets of instructions, mentioned above. One set of instruction performs few functions, internally within the computer and

another set of instruction performs noticeable actions externally. (like printing the mark sheet, merit list etc.).

Thus based upon the tasks performed by the software, softwares are broadly classified into following two categories:

- ❑ System Software
- ❑ Application Software

### System Software

All those instructions, which computer uses either for its activation or internal resource management are called system software. For example, software that would transfer the data/instructions from keyboard to computer's memory will be system software. Similarly the software that would make the processor run and do the calculations or print the result of calculations on printer/monitor will also fall into the category of system software. Following are the names of few system softwares, which are essentially required for normal functioning of computer system.

**Operating System** : Operating system is the first and foremost system software that is required for any computer system to become operational. For any computer system to become operational, it activates all its devices, components and resources and makes them ready for work.

It performs all internal management functions and ensures systematic functioning of computer.

**Commands** : All those instructions, using which, day-to-day housekeeping tasks are performed on computer, also fall into the category of system software. For example, commands for storing the data in file, viewing the contents stored in a file, making duplicate copy of a file, renaming a file etc. are all system software.

**Utilities** : All those softwares, which safeguard the computer and its resources from hazards or ensure its proper functioning or build an efficient working environment are called utilities. Utilities are basically system software. For example, data compression utilities, virus protection utilities, disk fragmentation utilities etc. are system software.

**Device Drivers** : That software, which is written with the objective of making a device functional when it is connected to the computer, is called device driver. For example, device driver for web camera, device driver for light pen, device driver for printer etc. are example of system software.

### Application Software

Those instructions, which are given to the computer for automating a manual task, are called application software. For example, instructions for adding two matrices, finding sum of given Geometric Progression (GP) series, calculating income tax for all the employees of an organization, booking air tickets etc. are examples of applications software.

Application software is either developed using special packages or special computer languages that are developed for this purpose.

Special software development packages like MS-Office, CorelDraw, Photoshop, Flash, 3-D Studio Max etc. are the packages that are developed to automate specific type of task. For example, MS-Office package has been developed for automating office activities (like writing letters, preparing reports and charts, making presentations, handling queries, etc.) Similarly CorelDraw is a package, using which desk top publishing work is performed on computer. Flash is used for creating animations on computer. Photoshop is used for photo editing tasks and 3-D studio Max is used for crating presentations.

There are many activities, which either don't fall within the scope of ready-made software or for such activities custom-built software need to be developed. Custom-built software is developed, using computer languages like Visual Basic, C++, Java etc. For example, there may not be any ready-made package available to computerize pay management activities of an organization. In this case, a custom-built pay roll package will have to be developed, for the organization. This package and many other of this type fall into the category of application software.

### **Firmware**

The software that is built into hardware is called firmware. For example, in computer system, few special instructions called bootstrap instructions (software) are written (with the help of special devices) within an electronic chip (hardware) called Read Only Memory (ROM) and this chip is integrated with the electronics of the computer system. This software basically reads the operating system, loads it into computer's memory and makes the hardware functional. Note that bootstrap program is an example of firmware as it always resides within electronic chip.

### **Data**

Raw facts and figures are termed as data. For example, roll numbers, name, address and marks of all the students studying in a class is data.

Data always has some surprise element (hidden facts) associated with it. Often (specially when data volume is large) this surprise element remains unnoticeable to the person who views the data. Thus, data carries no meaning for him.

Data works as raw material for computer system. Computer system processes the data and brings out the hidden surprise element in it. For example, after processing students' data a merit list may be prepared, showing the roll number, names and marks of 10 top rankers. This list is surprise element, which has brought out a hidden fact that these students are outstanding. Note that the details of these students were already there in the data but were unnoticeable to the viewer. Processing has brought them out and focused viewer's attention on them.

Note that surprise element helps in decision-making. For example, say three students have to be awarded scholarship of Rs. 25,000, Rs. 15,000 and Rs. 5,000. In this situation, surprise element (merit list in this examples) will be helpful in deciding, who should be awarded what amount. It is quite obvious that in the absence of surprise element, the chances were bright that the decision would have gone wrong.

## **Information**

In computer terminology, processed data is called information and information is always useful for decision making. Thus, it can be said that computer processes the data and converts it into information for decision making.

## **User**

Persons who make use of computers are called users. No computer system is complete, without user. From beginning to the end of automation process, they require user intervention. Users can be broadly classified into following two categories:

1. Programmers
2. End users

Programmers are the users, who use computers to write programs. Those programmers who write system programs (system software) are called system programmers and those who develop application programs are called application programmers.

End users are the persons, who make use of computer hardware, system software and application software for some specific purpose, for which the application software was designed. For example, the railway reservation clerks, sitting at reservation counter and doing reservations for passengers are end users of railway reservation package. Similarly there would be end users of other application packages.

## **COMPUTER PROGRAM**

Although wide variety of tasks can be performed through computer but computer being dumb device, doesn't perform anything on its own. May they be its internal operations or user's task; it requires step-by-step instructions for carrying them out.

Without instructions computer doesn't work. Set of instructions that are given to the computer for performing a specific task is called program or computer program. For example, set of 10 instructions give to the computer for identifying and printing the largest number among 20 given numbers will be a program. Similarly all those instructions, using which berths are reserved for passengers in trains will be another program. Likewise you have programs for every task that computer does. Without program computer is useless.

Programs are written in computer languages. For example, C, C++, Visual Basic, Java etc. are few popular computer languages that are commonly used for writing programs.

Those programs that are written for carrying out computer's internal tasks like transferring the data from keyboard to memory, from memory to processor or to monitor etc. are called system programs.

Programs that are written for computerizing manual activities like finding roots of quadratic equations, preparing invoice, railway reservation, hospital management etc. are called application programs.

If the task to be automated is larger, more than one program may be required for automating the complete activity. Set of all those programs is often referred to as package

or software package. In other words, it can be said that software package is a group of related programs that put together perform a given task that is generally big in nature. For example, railway reservation package, hospital management package, payroll package etc.

## SUMMARY

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*All those devices that compute are called computer. Computers have a long history. They have traveled a long distance from primitiveness to sophistication. Abacus is the first manmade computing device that came into existence. After Abacus many devices like Napier's Bones, Slide rule, Pascal's Calculator, Leibniz's Calculator, Charles Babbage Difference Engine, Babbage's Analytical Engine, Hollerith Machine, Mark-1, Electronic Numerical Integrator and Computer (ENIAC), Electronic Discreet Variable Automatic Computer (EDVAC) came into existence one by one. Lately came the era of modern computers. Each computer that came into existence was smaller in size but faster in speed than its predecessor.*

*Computers of specific electronic era are often referred to as a generation. All together four generations of computer have come into existence. First generation computers made using vacuum tubes. Second generation computer made use of transistors. Computers that were designed with the use of integrated circuits were called third generation computers. Current generation computers are fourth generation computers and are making use of VLSI chip. Computers that would have thinking power will come in future and are often referred to as fifth generation computers.*

*On the basis of input that computers accept, they have been classified into three categories:*

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

*Those computers, which take signals as input, are called analog computers. Those computers, which accept digits as input, are called digital computers. Those computers, which accept both types of inputs i.e. signals and digits are called hybrid computers.*

*Computers that we generally see in offices, schools, colleges etc. are digital computers. Digital computers have been classified into following categories:*

- 1. Microcomputers*
- 2. Mini computers*
- 3. Mainframe computers*
- 4. Supercomputers*

*Microcomputer is the smallest category of computers and supercomputer is the largest.*

*Physical part of the computer that can be seen or touched is often referred to as hardware. Hardware doesn't function on its own. It requires instructions to work. All those*



instructions that make the hardware work are called software. Softwares are broadly classified into following two categories:

- ❑ System Software
- ❑ Application Software

All those instructions, which computer uses either for its activation or internal resource management are called system software.

Those instructions, which are given to the computer for automating a manual task, are called application software.

A set of instructions, prepared for computer to perform a given task is called program.

Computer is mainly used for data processing. Raw facts and figures are called data. Once data is processed, it is called information.

## EXERCISES

## CHAPTER 1

### Short Type Questions

#### A. Select most appropriate answers for following questions:

1. What do you call that calculating device, which makes use of beads for calculations?
 

(a) Napier's Bones	(b) Slide rule
(c) Pascal's adding machine	(d) Abacus
2. Which of the following computing device was invented by the same person, who discovered logarithmic tables?
 

(a) Napier's Bones	(b) Slide rule
(c) Pascal's adding machine	(d) Abacus
3. Name the electronic component, which was used in first generation computers.
 

(a) Transistor	(b) Vacuum tube
(c) PCB	(d) IC
4. Which of the following device was the first device to make use of punched codes?
 

(a) Abacus	(b) Jacquard's loom
(c) Second generation computers	(d) Modern computers
5. Which of the following computer accepts signal and digits as input?
 

(a) Analog computers	(b) Digital computers
(c) General computers	(d) Hybrid computers
6. What is program?
 

(a) Computer language	(b) Set of instructions for computer
(c) Computer planning	(d) Physical part of computer

7. Which of the following is the largest category of computer?  
(a) Supercomputer (b) Microcomputers  
(c) Minicomputers (d) Mainframes
8. Which of the following is the largest category of computer?  
(a) Supercomputers (b) Microcomputers  
(c) Minicomputers (d) Mainframes
9. What do you call the physical part of computer?  
(a) Software (b) Program  
(c) Hardware (d) Package
10. What is processed data called?  
(a) Program (b) Information  
(c) Signal (d) Software

**B. Fill in the blanks:**

11. .... generation computers made use of VLSI chips.
12. Fifth generation computers will have.....power.
13. Slide rule is an example of.....computer.
14. Computers that we use in computer lab are.....computers.
15. Computers that are used in mines, ICUs etc. are examples of.....computer.
16. Computers that take signal as input are classified as ..... computers.
17. Those computers, which accept signals and instructions both, are called ..... computers.
18. Raw facts and figures are called .....
19. All those instructions, using which computer performs its internal tasks are called .....
20. Those computers, which make use of microprocessors to process the data are called .....computers.

**C. State, true or false for following statements:**

21. Abacus is first generation computer.
22. Pascal's adding machine could perform multiplication and division also.
23. ENIAC computer made use of vacuum tubes.
24. Speedometer of a vehicle is an example of digital computer.
25. Integrated circuits were first introduced in third generation computers.
26. ENIAC computer came after EDVAC computer.
27. Vacuum tubes came into existence before transistor.
28. Fourth generation computers are smaller in size and faster than third generation computers.

29. Processed data is called Information.
30. Physical part of the computer that can be seen or touched is called hardware.
31. Collection of computer instructions that put together automate a given task are called program.
32. PDA is a type of computer.
33. Mainframe computers are bigger than microcomputers and smaller than supercomputers.
34. Mainframe is the fastest among all types of computers available these days.
35. Weather forecasting type of applications can only be done on supercomputers.

**D. Answer the following questions in short:**

36. Which computing device was invented by Blaise Pascal?
37. Modern computers belong to which generation?
38. Name the mathematician who invented the calculating device called Napier's Bones.
39. Name any two types of signals that could be given as input to analog computers.
40. Which type of input is given to digital computers?
41. Which type of input is given to hybrid computers?
42. Which word will characterize fifth generation computer?
43. Which calculating machine made use of punched cards and which was the non-calculating device, from which the concept of punched card was taken?
44. Give an example of digital computer.
45. What is data?
46. What is information?
47. What is computer hardware?
48. What is software?
49. What is system software?
50. What is computer program?
51. What is package?
52. Name any two computer languages.
53. Name any three computers that fall into the category of microcomputers?
54. Which computer can be used while traveling in train or airplane?
55. Write the full form of PDA.

**Detailed Answer Type Questions**

**E. Answer the following questions in detail:**

56. Describe any five historic calculating devices, in the order, in which they came into existence.

57. What is ENIAC? Describe its characteristics.
58. What is vacuum tube? What is its relationship with computers?
59. How were second-generation computers different from third generation computers?
60. Write a short note on fifth generation computer.
61. What are analog computers? Give at least two examples of analog computers.
62. What are digital computers? Give an example of digital computer.
63. How are hybrid computers different from analog and digital computers? Give example of hybrid computers.
64. Write a short note on generations of computer.
65. Write basic characteristic of laptop computers.
66. Differentiate between system software and application software.
67. Differentiate between hardware and software.
68. Differentiate between data and information.
69. In what way modern computers are different from olden computers?
70. In what way supercomputers are different from supercomputers?
71. Define the term firmware. What is its role in computer?
72. What is device driver? Explain its role in computer?

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# Computer Application Theory

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## CHAPTER 2

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### *Computer Organization*

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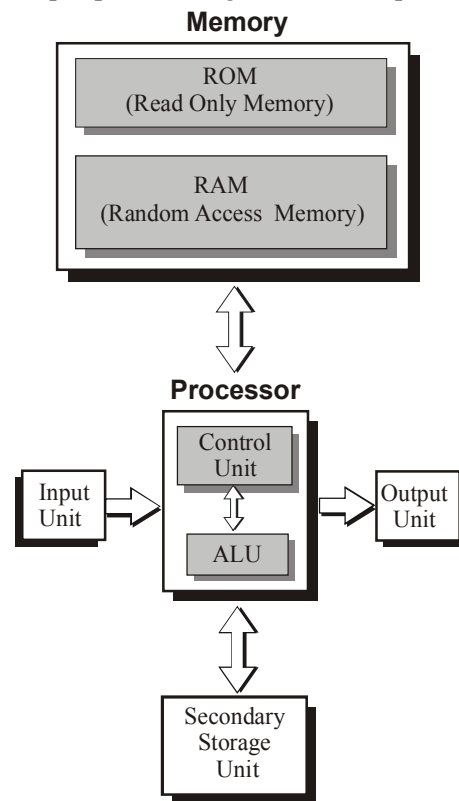
Computer is electronic equipment. It is mainly used for automating manual tasks. Using computer you can perform tasks quickly, effectively and in error free manner. Be it any organization, office, factory or institution, you can find people making use of computer there. In offices, computers are used for preparing letters, documents and reports. In hotels, computers are used for advance booking of rooms, preparing bills and providing enquiry services. In railways, computers are used for rail reservation, printing of tickets and preparation of reservation charts. Doctors use computers for diagnosing illness and treatment of deceases. Architects use them for map designing and city planning. In meteorology department, computers are used for weather forecasting. In short you can say that there is hardly any sphere of life left now, in which computers are not being used. What computer is, what are its main units, how does it function are the issues, which are described in this chapter.

#### **BASIC COMPONENTS OF DIGITAL COMPUTER**

As you know, computer is an electronic device, it comprises of many units. These units work in coordination with each other to perform the given task. Block diagram of computer is shown in figure 2.1.

Refer this figure and note that computer comprises of following units:

1. Input Unit
2. Output Unit



**Figure 2.1**

3. Input/Output Unit
4. Central Processing Unit
  - (a) Memory Unit
  - (b) ALU
  - (c) Control Unit

Physically these units exist in the form of electronic devices in computer. Each unit performs its own function, in co-ordination with other devices and thus computer performs the given task. What is the role of each unit and in what form do they physically exist, is explained below.

## INPUT UNITS

The role of input unit in computer is to provide means for supplying data or instructions to the computer. In other words, you can say that what you supply to the computer for processing is supplied through input unit. For example, if you wish to calculate simple interest on Rs. 10,000, @ 7% for 5 years then the data 10,000, 7, 5% etc. and the instructions for calculating the simple interest will have to be given to the computer, through input unit.

All those devices, using which input is provided to the computer are termed as input units. Following are few commonly used input units that can be found attached with almost every computer.

### Keyboard

Keyboard consists of many keys. Keys have alphabets, numbers, characters or words written on them. Keyboard is illustrated in figure 2.2.

When keyboard is connected to the computer, a blinking sign (| or -) appears on the monitor. This sign is called cursor. When you press an alphabet or number key, the character written on the key gets typed at current cursor position and the cursor moves forward.



**Figure 2.2**

### Keys

Keys of the keyboard are broadly classified into following categories:

- Alphabet keys
- Number keys
- Special character keys
- Function keys
- Cursor keys
- Action keys

**Alphabet Keys**

Alphabet keys have alphabets, from A to Z, written on them. By pressing these keys, you can type alphabets, words, sentences etc. in lower case. For example, when you press 'A' key, 'a' gets typed. To type the alphabet in upper case, you need to press Shift key along with the alphabet key. For example, if you press 'A' key along with Shift key, letter 'A' gets typed.

**Number Keys**

Number keys have digits, from 0 to 9, written on them. These keys are used for typing the numbers. Note that each number key also has a special character written just above the number. To type this character, you will have to press the number key along with the Shift key. For example, number 5 key has % sign marked on it. When you press number 5 key, 5 will get typed. If you press the same key, along with Shift key % sign will get typed.

**Special Character Keys**

Few keys of the keyboard have special characters like semicolon (;), comma (,), dot (.) etc. marked on them. Such keys are called special character keys. When you press special character key, character marked on it gets typed at current cursor position.

**Function Keys**

There are 12 function keys present on the keyboard. They are named as F1, F2, F3 .....F12. When you press these keys they perform special functions.

**Cursor Keys**

Four cursor keys are there on the keyboard. They are marked with arrows on them, pointing in four different directions. Using cursor keys, you can move the cursor from one place to another.

**Action Keys**

Keyboard has many action keys. When you press an action key, a special event takes place. Most commonly used action keys of the keyboard are described below.

**Caps Lock Key**

When you press this key, capital lock becomes on. When you press an alphabet key, while capital lock is on, the letter written on it gets typed in upper case.

**Shift Key**

Shift key is always pressed along with other keys. When you press this key along with number key then the symbol written on upper part of the key gets typed. When you press Shift key along with alphabet key then the alphabet gets typed in upper case.

**Enter Key**

Enter key is used to start a new line. When you press this key; cursor comes to the next line. Whatever you type now, gets typed in the next line.

### **Space Bar**

This key is used to put blank spaces between the two characters.

### **DEL Key**

This key is used to rub a character from current cursor position.

### **Backspace Key**

This key removes one character from the left side of the cursor.

### **Insert Key**

This key is used to insert characters in between the two characters, which have already been typed.

### **Page Keys**

There are two page keys on the keyboard, named as PgDn (i.e. Page Down) and PgUp (i.e. Page Up). When you press PgUp key, previous page gets displayed on the screen. When you press PgDn key, next page gets displayed on the screen.

### **Tab Key**

This key is used for making the cursor jump in forward direction, by many places.

### **ESC Key**

This key is called Escape key. Currently on-going activity gets cancelled when this key is pressed.

## **Mouse**

Mouse is an input device. It is shown in figure 2.3. It looks like a real mouse with few buttons placed on its back. When mouse is connected to the computer, an arrow sign appears on the monitor screen. This sign is called Mouse Pointer.



**Figure 2.3**

When you move the mouse on plane surface, mouse pointer also moves in the same direction. Thus by moving the mouse, you can make the mouse pointer point to anything present on the screen. After pointing the mouse on any desired object, following actions can be performed:



**Clicking The Mouse**

Pressing the left button of the mouse and releasing it is called clicking the mouse.

**Double Clicking The Mouse**

Pressing the left button of the mouse twice, in quick succession, is called double clicking the mouse.

**Dragging The Mouse**

Moving the mouse, with its left button pressed is called dragging the mouse.

**Dropping**

Moving the finger away from the mouse after dragging it is called dropping.

**CD-ROM Drive**

CD is acronym for Compact Disk. It works as a medium for storing data or instructions. It looks like circular plastic disk. Huge amount of data can be stored on CD. For example, single CD can hold personal data of all the students studying in a college.

CD-ROM drive is an input unit that reads data from CD. As the name indicates, CD-ROM (Compact Disk Read Only Memory) can only read the data from CD, it cannot write on it. CD and CD-ROM drive are shown in figure 2.4.



**Figure 2.4.**

**Other Input Units Of Computer**

Microphone, Barcode Reader, Magnetic Ink Character Reader (MICR), Joystick, Touchpad, T Mouse, Light Pen, Touch Screen, Scanner etc. are other input devices.

**OUTPUT UNIT**

The role of output unit is to show the result of processing. In other words, you can say that computer displays all the results on its output unit. For example, if you are calculating simple interest on computer, it will display the interest amount on its output unit. Following are few commonly used output units of computer.

## VDU

VDU is acronym for Visual Display Unit. It looks like portable TV. VDU is shown in figure 2.5. It is primarily used for following two purposes:

- ❑ To display the contents that are being typed through keyboard.
- ❑ To display the result of processing (output).



**Figure 2.5**

## Printer

Printer is an output device. It prints the output on paper. Different types of printers print differently. Their quality and speed of printing differ from each other. Following are different types of printers, which are being commonly used these days:

1. Dot Matrix Printer
2. Inkjet Printer
3. Laser Printer

### Dot Matrix Printers

These printers are very versatile printers and derive their name "Dot Matrix" from the fact that they print the characters making dots. Pins of the printer print these dots so close to each other that the gap between them is hardly visible. Viewer gets an impression of full continuity. These printers are versatile printers and are capable of printing not only text, but up to some extent graphics also. They are relatively fast printers and their speed varies from 300 Character Per Second (CPS) to 600 CPS.

### Inkjet Printers

For printing the characters and drawings, inkjet printers make use of colored inks. They use Cyan, Magenta, Yellow and Black inks. Using these four basic colors, inkjet printers generate all other colors. These printers are very popular due to their high quality and low cost.

### Laser Printers

These are high quality, high speed and high cost printers. In such type of printers, printing is done, using laser beam and black magnetic powder, called Toner. Speed of these printers can range from 10 pages per minute to about 200 pages per minute. They cost much higher than dot matrix and inkjet printers. All the three types of printer are shown in figure 2.6.



**Dot Matrix Printer**



**Inkjet Printer**



**Laser Printer**

**Figure 2.6**

## Other Input Units Of Computer

Plotter, Web Camera, Digital Camera, Speakers, etc. are few other output devices.

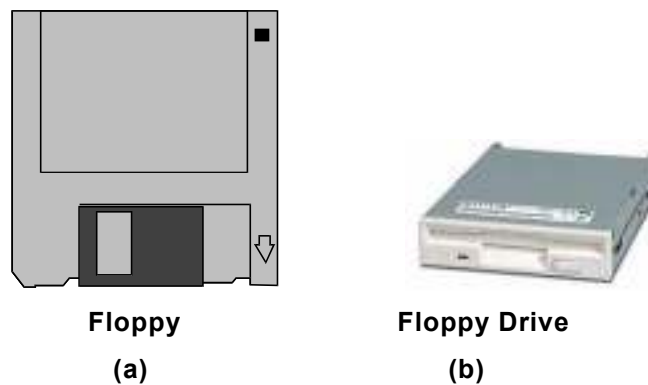
## INPUT/OUTPUT UNITS

As you know, input units provide means for supplying data or instructions to the computer, while output units provide mechanism for displaying the results. While making use of them data, instructions or results involved in this process do not get retained permanently in computer. They get erased when computer is switched off. If you need them again, process has to be repeated. On contrary to this, Input/Output units serve the purpose of both i.e. input unit and output unit as well. They retain the data/result permanently. Whenever required, the data, instructions or results can be written on them. Later, as and when required, they can be read from there.

All such units, which provide means for storing the data, instructions or results permanently, are called input/output units. Following types of Input/Output units are commonly used in computer.

### Floppy Drive

Floppy drive is an Input/Output unit. It is basically an assembly, in which you put the floppy, close its door and then perform read / write operations on the floppy. For analogy, you can think of tape recorder's cassette housing assembly, in which you put the cassette, close the door and then perform read / write operations on the cassette. Similarly you either write the data on the floppy or read the data from the floppy. Whatever you write on floppy, it gets permanently stored there, until you delete it yourself or mishandle the floppy. Floppy and floppy drive are shown in figure 2.7.



**Figure 2.7**

Floppy is basically a data storage medium, on which you record the data or programs to read them later. Floppy consists of flexible plastic coated with magnetic material iron oxide. This plastic is enclosed in a thick black gasket cover, which protects it from heat, dust, sun etc. Most commonly used floppies are of 3 ½" size.

## Hard Disk

Hard disk is another unit, which stores the data permanently in computer. Externally it looks like a box and remains fixed within computer chassis. Its internal composition is shown in figure 2.8.

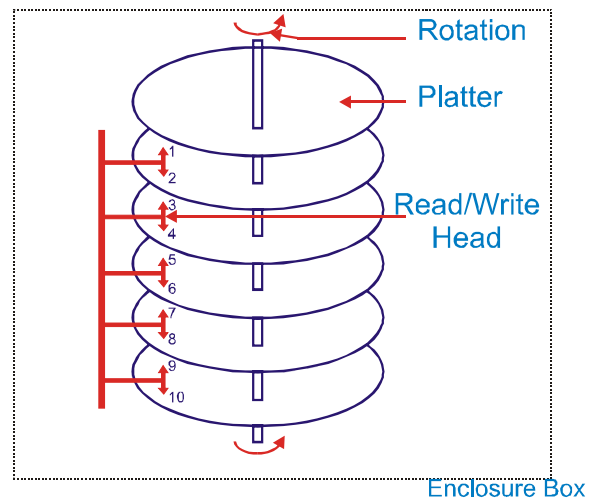
Refer this figure and note that hard disk consists of multiple dish like units, on which the data is stored. These dishes are called platters. Each platter has a corresponding read-write head.

Read-write heads write the data or instructions on the platters. Thus they get permanently stored there.

Note that floppy and hard disk both are used for storing data but the capacity of the hard disk is generally many times more than that of a floppy. Floppy is a removable storage medium while hard disk is a fixed medium.

## CD-Writer

CD writer is another Input/Output device, which stores data, instructions, results etc. permanently on medium called CD-R and CD-R/W.



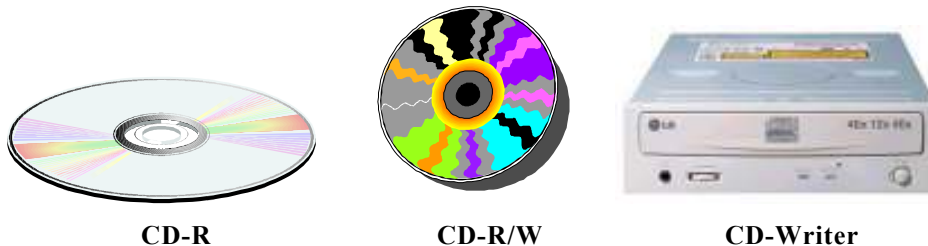
**Figure 2.8**

## CD-R

CD-R is acronym for Compact- Disk Readable. It resembles CD, on which data can be written. Data is written on CD-R through a device called CD Writer. CD-R looks like CD but its internal composition remains different. But note that data can only be written once on CD-R but not again and again.

## CD-R/W

CD-R/W is acronym for Compact Disk Re-Writeable. It looks similar to CD-R but data can be written multiple times on it. If you wish, you could write data on it, read data from it and erase the data as many times as required. CD-Writer and CD-R are shown in figure 2.9.



**CD-R**

**CD-R/W**

**CD-Writer**

**Figure 2.9**

## Magnetic Tape Drive

Magnetic tape drive is another input/output unit, which is used for storing the data permanently. It accesses the data sequentially. Using this unit, data is recorded on magnetic tapes. Magnetic tape drive in its appearance looks like older spool based tape records. Its block diagram is illustrated in figure 2.10.

In magnetic tape drive, magnetic tape from feeder spool passes below the Read/Write head and remains tied in other spool.

When magnetic tape drive is switched on and instructions for writing the data are given, the spool on the right hand side rotates. Thus the tape moves forward. Read/Write head records the data on moving tape.

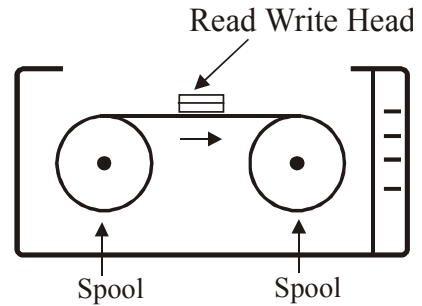


Figure 2.10

To record the data properly on tape, it is necessary that magnetic tape should always remain in stretched position. While the spools move or stop, tape should not get loose. If it so happens, data will not get recorded properly and will produce garbage, when read. Generally two techniques are used to keep the tape stretched. They are as follows:

1. Tension arm
2. Vacuum column.

In tension arm technique, tape is kept stretched, with the help of mechanical arms while in vacuum column technique tape is kept stretched by creating vacuum. Those tape drives, which use tension arm technique, are called tension arm tape drives. Those tape drives, which use vacuum technique, are called vacuum column tape drives.

## Magnetic Tape

Magnetic tape is a medium to record the data. Generally it is 12.5 mm. to 25 mm wide and 500 meters to 1200 meters in length. It is made of magnetic material coated plastic. When the tape passes below read/write head, it creates magnetic waves and writes data on the tape. Note that data does not get continuously written on the tape. It gets recorded in blocks. There remains a gap (blank space) between the two blocks. This block is called Inter Block Gap or IBG in short. The way data gets stored on the tape, is illustrated in figure 2.11.

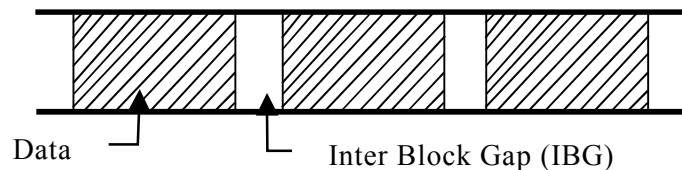


Figure 2.11

## Magnetic Cartridge Tape Drive

Like magnetic tape drive, magnetic cartridge tape drive is also an Input/Output unit, which records the data on tape. Cartridge tape drives are much smaller in size than magnetic tape drives. They do not store the data on spool tapes. They store it on cartridge tapes. Cartridge tape resembles small video tape that is used in handy cams. The shape of cartridge tape is shown in figure 2.12.

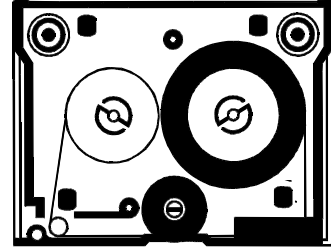


Figure 2.12

## CENTRAL PROCESSING UNIT

Refer figure 2.1 and note that three units viz. Memory, ALU and Control Unit put together are referred to as Central Processing Unit or CPU in short. Role of each unit is explained below.

### Memory

Memory holds data, instruction or results temporarily. For example, when you give instructions to the computer to compute simple interest on Rs. 10,000, @ 7% for 3 years, this data and instructions come into computer from any of the input or Input/output devices and get stored in memory. Similarly result (simple interest in this example) also gets stored in memory. In other words, you can say that the unit, which holds data, instructions or results in it, is called memory.

### Types Of Memory

Depending upon the nature and behavior of memory, computer memories could be categorized into following categories:

1. Primary Memory
2. Cache Memory

Characteristic behavior of each type of memory is described below.

### Primary Memory

That memory, which is utilized by the computer for its internal functioning, is called primary memory. Since it plays an important role in internal functioning of computer hence it is often referred to as internal memory. Primary memory is further categorized into two categories:

1. Read Only Memory (ROM)
2. Random Access Memory (RAM)

### Read Only Memory (ROM)

This memory by its nature is quite special. Computer cannot write data in it. Using special devices, such as ROM programmer, instructions are written in it. Once instructions are written in it, it is put inside the computer. As and when required, computer reads instructions from it. Since data can only be read from it hence it is called Read Only

Memory or ROM in short. ROM physically exists in the form of blank electronic chip, in which programs or data are written, using special devices. Those ROMs, in which data once written, cannot be erased by any means are called Programmable Read Only Memory or PROM in short. Other type of ROM, in which data is written or erased, using ultraviolet rays is called Erasable Programmable Read Only Memory or EPROM in short.

### Random Access Memory

In short, Random Access Memory is called RAM. It differs from ROM in nature. It provides both, reading and writing facilities. As and when required, computer writes data or instructions in it and reads them whenever necessary. This is the reason why they are also called Read/Write memory.

Note that whatever data or instructions are given to the computer for processing, computer writes them in RAM. As and when required, it reads them from there and processes them to generate the result. Computer first writes all the results in RAM and then whenever necessary, it transfers them to output unit.

The data written in Random Access Memory remains there till the time computer power is on. As soon as the power goes off, data written in RAM gets erased. This is the reason why they are also called Temporary memory.

### Cache Memory

In cache memory reading and writing operations take place at very fast speed but it costs very high. When it is introduced into computer, it increases its speed and cost also. For best cost-performance ratio, sufficient amount of cache memory (less than the size of RAM) is introduced in the computer, in between the processor and Random Access Memory, as shown in figure 2.13.

First time, when computer requires data/instructions/results from RAM, it reads them from there. But at the same time, many more of them are read and put in cache memory. Next time, whenever computer requires something from RAM, it reads it from cache memory. Since the speed of cache memory is faster than RAM hence reading is done in much shorter time. When computer doesn't get the required item in cache memory, it goes back to RAM and reads it from there along with many more items. The whole mechanism of reading and writing, in computers, is implemented in such a way that most of the time required items are found in cache memory. On the other hand, if computer has to write the data in RAM, it writes it in cache memory, from where it is transferred to RAM.

Thus cache memory improves the speed of computer. In short, it can be said that the memory, which is introduced in the computer with objective of increasing its speed, is called cache memory.

### Arithmetic & Logic Unit - ALU

ALU is acronym for Arithmetic and Logic Unit. It performs arithmetic and logical calculations in computer. Recall that calculations like, addition, subtraction, multiplication

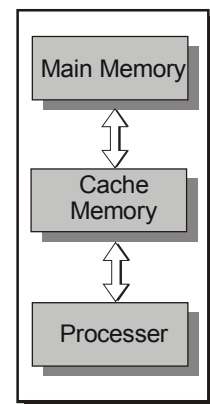


Figure 2.13

division etc. fall into the category of arithmetic calculations. Operations like  $a > b$ ,  $c >= d$  etc. are logical operations. In computer terminology, the activity of performing arithmetic and logical calculations is called processing. In other words it can be said that in computer ALU performs data processing.

### **Control Unit**

While computer functions, data moves from one unit to another unit. For example, when you give input to computer, data and instructions move from input unit to memory. When data is processed, it moves from memory to ALU. Similarly when processing is over, results move from ALU to memory and memory to output unit. Now the question is which part of computer organizes data movement within the computer? Well, Control Unit is the main unit, which performs traffic police like task. It ensures movement of right data from right source, to right destination at right time so that all the units of computer perform their functions in coordination with each other.

## **CHARACTERISTICS OF COMPUTER**

Following are the characteristics of computer:

1. Computers are basically dumb devices. They cannot perform any function on their own. For doing anything on computer, you have to give instructions to them. Generally these instructions are written in computer language and are given from the keyboard.
2. Computer performs the tasks according to the instructions provided by the user. In other words, you can say that the correctness of output depends upon the correctness of the data and the instructions provided by the user. For example, if you add two numbers 70 and 30, the result could be 40 in case you have given wrong instruction i.e. subtraction instead of addition.
3. The speed, with which a computer performs a task is much faster than manual speed. As a result of which, computers are widely used for performing those tasks, in which speed is of prime importance.
4. Computer can perform a task with the same speed for several days without getting tired. This is not possible in case of manual activities. Human beings get tired after sometime and the chances of making mistakes start getting high as the time passes by. So you can say that computers are capable of performing error free tasks efficiently for the duration, which is beyond human capabilities.

## **SUMMARY**

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*Computer is basically an electronic device. It is mainly used for data processing. Computer comprises of many devices. Its block diagram is shown in figure 2.1.*

*All those devices, using which data or instructions are provided to the computer are called*



*input units. Keyboard, Mouse, CD-ROM drive etc. are common input devices.*

*All those devices of computer, using which it provides result of processing to us are called output devices. VDU, printer etc. are common output devices.*

*Those devices of computer, on which it stores data permanently so that it could be read later, are called input / output devices. They are called so because they serve the purpose of input and output devices, both. Floppy drive, Hard disk, Magnetic tape drive, Cartridge tape drive, CD-Writer etc. are few examples of Input / Output devices. Since these devices are used for storing bulk data hence they are also called bulk storage devices or secondary storage devices. The medium, on which they store data / information are called permanent memory. For example, floppy drive stores data on floppy. Floppy is often referred to as permanent memory.*

*Those units, in which computer holds data for some time are called memory. Depending upon the nature and behavior of memory, computer memories are categorized into following categories:*

- 1. Primary Memory*
- 2. Cache Memory*

*That memory, which is utilized by the computer for its internal functioning, is called primary memory. It is further categorized into two categories:*

- 1. Read Only Memory (ROM)*
- 2. Random Access Memory (RAM)*

*That memory, in which computer performs only read operations is called Read Only Memory. Computer can't write in this memory.*

*That memory, in which computer performs read and write operations randomly is called Random Access Memory.*

*Cache memory is fast memory. Its basic objective is to increase the speed of computer. It is placed in between processor and RAM. If it remains present in computer, computer performs all its read write operations in it, instead of performing in RAM. Later whatever is written in it is transferred to RAM. Cache memory makes computer read write operations very fast.*

*Arithmetic and Logic Unit (ALU) of computer performs all arithmetic and logical operations.*

*Control Unit of computer ensures movement of right data from right source, to right destination at right time so that all the units of computer perform their functions in coordination with each other.*

*Computers are basically dumb devices. They perform the tasks according to the instructions given to them by the user. Their working capabilities are much beyond the capabilities of human beings. They can perform a task at very fast speed for long durations without making any mistake.*

**EXERCISES****CHAPTER 2****Short Type Questions****A. Select most appropriate answer for following questions:**

1. Which type of device, a computer is?  
(a) Mechanical      (b) Electrical      (c) Magnetic      (d) Electronic
2. Which part of computer stores data temporarily?  
(a) RAM      (b) ALU      (c) CU      (d) CPU
3. Which of the following device will be used for displaying the result?  
(a) Keyboard      (b) ALU      (c) VDU      (d) Mouse
4. Which of the following can be used for storing the data permanently?  
(a) RAM      (b) Hard disk      (c) Mouse      (d) VDU
5. Which of the following is an example of software?  
(a) Mouse      (b) Memory      (c) Operating System      (d) Printer
6. Which of the following is purely an input device?  
(a) Mouse      (b) Floppy      (c) Hard disk      (d) Printer
7. Which of the following is an not an input/output device?  
(a) Hard disk      (b) Floppy drive  
(c) CD-ROM drive      (d) Magnetic tape drive
8. Which of the following is used for increasing the speed of read write operations in computer ?  
(a) RAM      (b) ROM      (c) Cache memory      (d) Bulk memory
9. Which of the following unit performs all calculations in computer?  
(a) ALU      (b) Memory      (c) Control Unit      (d) Keyboard
10. Which of the following is sequential storage device?  
(a) Hard disk      (b) Magnetic tape drive  
(c) CD-ROM drive      (d) Floppy drive

**B. Fill in the blanks:**

11. RAM is acronym for .....
12. ROM is acronym for .....
13. PROM is acronym for .....
14. CU is acronym for .....
15. ALU is acronym for .....

16. Those devices, using which data is provided to the computer are called ..... devices.
17. .... is an example of input device.
18. .... stores data on metallic platters.
19. Floppy drive stores data on ..... permanently.
20. .... is an example of secondary storage device.
21. Cache memory in computer is placed in between ..... and .....

**C. State, true or false for following statements:**

22. Keyboard is the main input unit for computer.
23. Floppy drive is an output device.
24. Data, instructions or results can be permanently stored on hard disk.
25. In computer, Control Unit performs all arithmetic and logical operations.
26. ROM programmers are the special devices that are used for writing data in Random Access Memory.
27. Mouse is a pointing device.
28. Drag and drop operations are generally done using keyboard.
29. Speed of RAM is always faster than cache memory speed.
30. Contents can always be written in ROM but not read from it.
31. Computer cannot work without instructions.

**D. Differentiate between the following:**

32. Input and output units of computer.
33. RAM and ROM.
34. Secondary memory and cache memory.
35. Tension arm tape drive and vacuum column tape drive.
36. Magnetic tape drive and cartridge tape drive
37. Dot matrix printers and inkjet printers.
38. Floppy and CD.
39. Arithmetic operations and logical operations.
40. CD-R and CD-R/W.
41. CD ROM drive and CD Writer.

**Detailed Answer Type Questions**

**E. Answer the following questions in detail:**

42. What is computer? For what purpose it is used?
43. Name any three places, where computers can be used?
44. Draw a block diagram of computer and label its component.

45. Describe the role of keyboard and mouse in computer? What are the fundamental similarity and differences between them?
46. Name any two output devices.
47. What is the role of memory in computer? Name any two medium, which serve the purpose of permanent memory.
48. What do you understand by logical operations? Which part of computer performs arithmetic and logical operations?
49. Describe characteristics of computer.
50. What is cache memory? What is its purpose in computer?
51. Describe the functioning of cache memory in computer?
52. Describe the way magnetic tape drive stores data on magnetic tapes.
53. Describe the role ALU in computer?
54. Describe the role of Control Unit in computer.

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# Computer Application Theory

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## CHAPTER 3

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### *Operating System*

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#### **INTRODUCTION**

A computer system is basically combination of hardware and software. For its functioning it requires different types of hardware devices, electronic components and various types of software. Operating system is one of the software, which computer uses for its internal functioning. What operating system is, what are its functions and what types of operating systems are commonly available for use are the issues that are described in this chapter.

#### **OPERATING SYSTEM BASICS**

Operating System is essential software that is required for a computer to become operational. It provides functionality to computer hardware, so that electro-mechanical components of it perform read, write and processing functions as human being do.

Without operating system, computer cannot work. In the absence of operating system, neither input devices will be able to provide data to the computer nor memory will be able to store anything it nor processor will be able to process the data nor output devices will be able to show the result. Managing computer's resources and making them work in coordination with each other is the responsibility of operating system.

Any instruction given by the user to the computer to perform a function is actually carried out by operating system. It is the operating system, which on receiving instructions from the user invokes all internal units to perform their duties and workout the result. Details of operating system are described below.

#### **MAJOR FEATURES OF THE OPERATING SYSTEM**

Operating system is essential software, purpose of which is to activate the computer and:

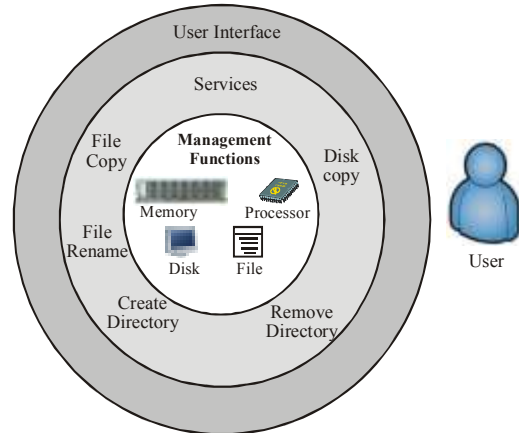
1. Perform internal management functions.
2. Provide services.
3. Provide user interface.

Internal management functions are the functions that have to be essentially performed to make the computer work. Services are bunch of commands and utilities that operating system provides to its users to have better control over computer. User Interface is the methodology, using which user interacts with computer. Block diagram, showing the basic structure of operating system is shown in figure 3.1.

## Management Functions Of Operating system

Essential functions that an operating system performs are:

- Process management function
- Memory management functions
- Information management functions
- Device management functions



**Figure 3.1**

What these functions are, where do they fit in data processing cycle, is explained below.

## Process Management Functions

Programs that are to be executed and their data, initially reside within computer's memory. For executing them they are taken to the processor, arithmetic and logical operations are performed within the processor, result of processing are transferred back to the memory and processor is set free for performing other tasks.

All these processor related operations are called process management functions. It is quite obvious that these functions cannot be carried out on their own. Some software is required to perform these functions. Operating system is the software, which performs these process management functions.

## Memory Management Functions

All the programs that are to be executed and the result that are to be printed, have to be essentially present in memory. When any such item comes to memory, it is accommodate in some free portion of the memory. If there is no free space, swapping procedure is started.

On the other hand, if any item present in memory is no more required then memory is reclaimed and free space is created. All these functions are memory management functions and are performed by operating system.

## Information Management Functions

Permanent storage of information within computer is an essential requirement of any computer environment. For this, data / information is written on the secondary storage devices, in well systematic way. In this process, all arrangements are made to ensure that

new data / information being written on the device doesn't overwrite previously written data / information and afterwards it is easily retrievable in its, original form. All those activities, which are carried out in computers for this objective are called information management functions and are carried out by operating system.

## **Device Management System**

Keyboard, monitor, floppy drive, hard disk etc. are few devices that are part of almost every computer. In computers their functionality is partially controlled by hardware and partially controlled by software.

Operating system is the software that controls these devices. For example, when a command is given from the keyboard, keyboard controller card (hardware) converts it into computer readable form and operating system (software) interprets it and executes it. Similarly disk controller card (hardware) places the read / write head of the disk at appropriate place, and operating system performs the writing function.

## **Services Provided By Operating System**

Apart from performing above mentioned management functions, operating system provides many commands and utilities for doing housekeeping tasks. For example, it may provide utility for:

- Listing the names of all files and directories, present on a disk.
- Copying the contents of a file into another.
- Compressing the file and uncompressing the files.
- De-fragmenting the disk.

## **User Interface**

While working on computer, user has to interact with computer. For example, if a program is to be executed, user has to communicate to the computer that this is the program, which is to be executed.

Note that different operating systems provide different ways of interacting with computer. In computer terminology, the method of interaction is often referred to as user interface. User interfaces are basically of two types:

1. Command Line Interface (CLT).
2. Graphical User Interface (GUI).

Details of both the types of interfaces are given below:

### **Command Line Interface**

In command line interface, user interacts with the computer by typing the commands in specified format. Thus he mostly makes use of keyboard to interact with the computer. For example, to copy the contents of data.dat file in data.bak file, he will have to type the command in following format:

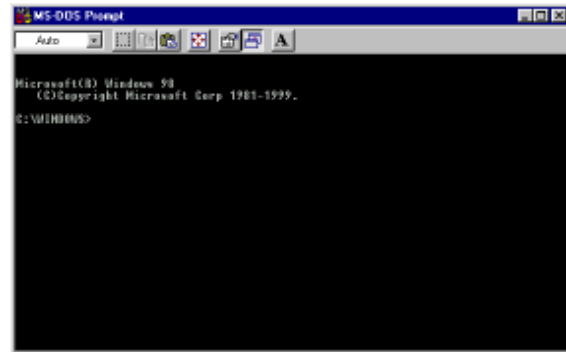
COPY [name of file to be copied] [name of file in which contents have to be copied]

Thus he will type the following contents:

COPY data.dat data.bak

Note that in such type of communications, user has to remember the name and format of the commands. Spelling mistakes and deviations in format lead to errors and the task is not performed.

MS-DOS, Unix, Linux etc. are few operating systems, which provide command line interface. Visual appearance of MS-DOS's command line interface is illustrated in figure 3.2.



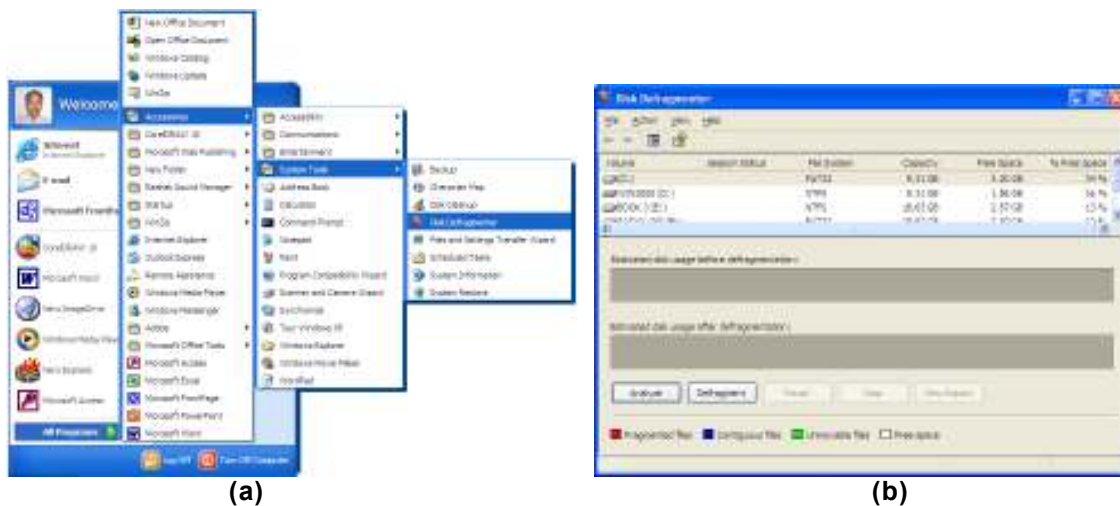
**Figure 3.2**

### Graphical User Interface

In graphical User Interface (GUI), user interacts with the computer through graphical items, such as icons, menus dialog boxes etc. As and when required, these items automatically appear on the monitors and user has to simply select his choice from the displayed items, by clicking the mouse on desired option. Thus in this type of communications, user mostly makes use of mouse to interact with computer.

To understand the concept of GUI, refer, menus shown in figure 3.3(a). To invoke defragmentation program, user need not remember the command name and command format, as he had to do in command line interface. For this, he simply needs to click the mouse on the corresponding option present in the menu. When he does so, computer interacts with him through GUI objects like submenus, dialog boxes, alert boxes etc., as shown in figure 3.3(b)

Windows, Macintosh operating system, OS/2, some versions of Linux, Unix etc. provide graphical user interface to interact with computer.



**Figure 3.3**



## GUI COMPONENTS

Graphical user interface makes use of following GUI components to make the user interaction easy and interesting:

### Program Icons

All those icons that represent program are called program icons. Some of the program icons are illustrated in figure 3.4(a). To run the program, you need to double click the mouse on its program icon. For example, to execute Date/Time program, you will have to double click the mouse on its icon.

### Objects Icons

All those icons that represent objects like, devices, files, folders etc. are called object icons. Some of the object icons are illustrated below.



Represents Floppy drive.



Represents hard disk.



Represents a folder.



Represents executable file.



Represents non-executable files.



Represents data file.

### Menus

Following types of menus appear in GUI. Each menu provides various options. An option is selected by clicking the mouse on the desired option.

1. Popup menu
2. Shortcut menu
3. Bar menu

### List Boxes

List boxes display various choices within a box (names, numbers, symbols etc.). An item of choice is selected by clicking the mouse on it. A list boxes is shown in figure 3.4(d).

### Drop Down List Box

Drop down list box is another type of list box that looks like a text box with a down

pointing arrow button on its right hand side. When you click the mouse on the arrow, a list of options drops down. To select any option from this list, you need to click the mouse on it. A drop down list is shown in figure 3.4(d).

### **Check Boxes**

Small square shaped buttons (could be one or more) form check boxes. Labels written near the buttons give an indication of the type of data / information that will get selected, when you click the mouse on it. When you select a check box, a mark gets placed within the check box. If you wish, you could select more than one check box from the group. Check boxes are illustrated in figure 3.4(c).

### **Radio Buttons**

Group of at least two or more rounded buttons form radio buttons. Labels written near buttons give an indication of the type of data/information that will get selected when you click the mouse on it. Only one radio button, from the group can be selected. When you select a button, a black dot appears within the selected button. Radio buttons are illustrated in figure 3.4(c).

### **Spinner**

A spinner consists of two arrow buttons and a text box, with some value written into it. One arrow points up and the other points down. When you click the mouse on up arrow, the value in the text box increases. When you click it on down arrow, the value in the text box decreases. A typical spinner is illustrated in figure 3.4(b).

### **Text box**

Text box consists of rectangular blank area, in which contents are typed. A typical text box is illustrated in figure 3.4(d). Note that the label written beside the text box gives the idea of the contents that are to be typed in text box. For example, the label "File name" indicates that the name of the file is to be typed in this text box.

### **Buttons**

Rectangular labels, with some text written on them form buttons. Few buttons are illustrated in figure 3.4(d). When you click the mouse on the button, an action takes place. The text written on the buttons, generally gives an indication of the action, which will take place, when you click the mouse on it. For example, when you click the mouse on "Open" button, the file mentioned in the dialog box gets opened.

### **Toolbars**

A row of small buttons, with icons in them forms a toolbar. Each button perform a specific task when you click the mouse on it. A typical toolbar is illustrated in figure 3.4(a).

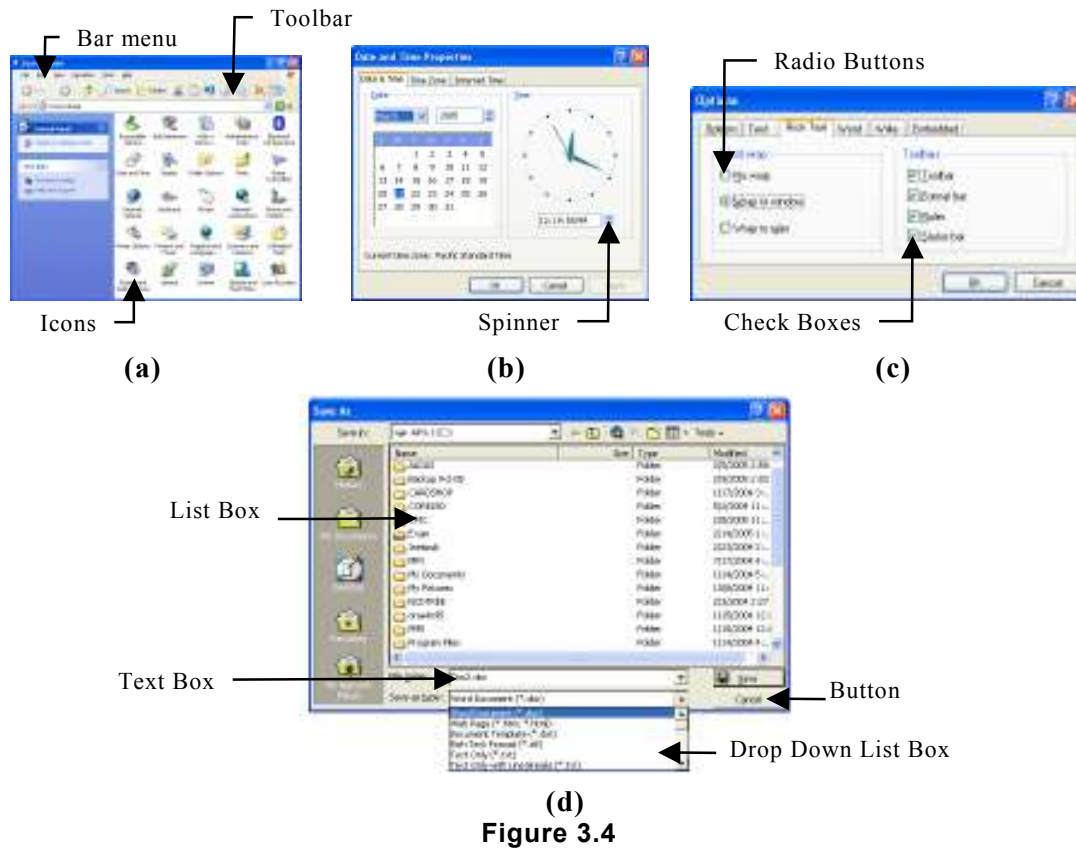


Figure 3.4

## MOST DESIRABLE CHARACTERISTICS OF OPERATING SYSTEM

As man's popularity and acceptability depends upon his character, operating system's popularity depends upon its characteristics. Following are the most desirable characteristics of operating systems:

### Easy-To -Use

Be it any operating system, it is required that its user interface should be user friendly. Process of invoking commands, utilities and applications should be easy.

Few decades back, when devices like modern monitors and consoles were not available, people had to interact with computer through punch cards and tapes. What data is going into computer could neither be seen nor modified on-line. In those times working on computer was really a tough task. Price and unfriendly user interface were the two factors that were against computer's popularity. Introduction of Character User Interface (CUI) made interaction with computer easy to some extent, but with the advent Graphical User Interface (GUI), problem got solved to large extent. It is due to Graphical User Interface

that even a child can operate computer these days. Hand writing recognition, voice recognition systems etc. are now being incorporated in operating systems. They, coupled with other sophisticated modern hardware devices, are adding new dimensions to computer's functionality. For example, operating system of the table PC supports these features.

### **Reliability**

Performance of the operating system should be reliable. Each time it executes a program, it should produce same result with same efficiency.

It should sustain abrupt power failures and shutdowns. It should not so happen that these hazards corrupt user's data or system files. It is required that operating system should be robust in nature and should withstand all odd conditions.

### **Speed And Efficiency**

Response time is one of the prime factors that attributes to the success of any operating system. Response time of any operating system partly depends upon the quality of the hardware and partly upon the efficiency of the algorithms that has been implemented for internal resource management. It is quite obvious that computer with faster CPU, faster memory etc. will produce faster results. Such a hardware managed by efficient operating system will produce still faster throughputs.

### **Reusability**

With wide variety of processors and other hardware computers available these days, it is required that operating system written for one type of computer should be easily portable to other hardware platforms. This saves time, effort and cost. Object oriented approach for programming promotes reusability to a large extent.

### **Security**

Security is the most desirable characteristic of any operating system. An operating system should provide means for safeguarding system resources from unauthorized users and protection of one user's resources from other users of the system.

With the advent of Internet and local area networks getting popular, even single user computers need to interact with other computers these days. Such situations demand tight security features. Popular operating systems offer these features through incorporation of following:

- (i) Login name.
- (ii) Login password.
- (iii) Read, write, access file permissions.
- (iv) Encryption of data.
- (v) Virus protection software layers.

## **Adaptability**

With the advancement in electronics and its focus on miniaturization, wide variety of plug-in devices has suddenly invaded the market. Each device is meant for getting connected to the computer and working in coordination with other devices. In this scenario, it is desired that operating system should be adaptable enough to accommodate these devices easily.

Quite sometime back, it was very difficult to add new devices to the system. Lot of changes and modifications had to be done in system files to make the new device functional. Now the scenario has completely changed. These days operating systems have large database of device drivers built into them. They support plug and play feature. They automatically sense the presence of new device in the system and load corresponding device drive automatically. Operating systems have helpful wizards incorporated in them. In all those events, in which they fall short of any data, software or hardware, wizards is invoked automatically. Wizard guides the user to perform all necessary steps for making the device /system operational.

## **Compatibility**

Data communication and resource sharing are the two prime activities that need to take place in most of the working environments these days. Wide variety of hardware, operating systems, and applications need to interact with each other. So it is highly desirable that operating system should be communication protocol rich so that it is compatible with other operating systems. Files and programs of other computers should be accessible in the same way, as files and programs of local computer remain available.

Most of the operating systems these days are compatible with other operating systems. Effective protocols and software layers have been incorporated in operating system to promote compatibility issue.

It is also desired that Internet connectivity and accessibility issues are inbuilt into operating system. No addition and alterations should be externally required. For example, in the earlier days of Windows-95 operating system, many software and utilities (including internet explore) had to be installed on top of operating system to get connected to Internet and avail its services. But in the later versions like Window-98, Window-XP etc. these services became integral part of the operating system. As soon as operating system is installed on computer, it becomes ready for Internet access.

## **Multimedia Support**

Computer is no more data crunching tool now. It is more like multimedia electronic device. Its usage is no more limited to numbers and words. Graphics, sound, animation, video etc. fall within the preview of its capabilities.

These days it is desired that operating system should support all multimedia features to accommodate wide range of multimedia hardware devices. Multimedia operations like photo editing, sound editing and playing, animation and video effect etc. should be possible on computer.

GUI based operating system of modern times, like Windows, Linux etc. provide strong support for multimedia operations.

You are now familiar with some of the most desired characteristics of operating systems. Characteristics mentioned above are part of most popular operating systems of today. Some of the characteristics that are not part of modern operating system, but are very much required because of change in computing requirement are described below.

## **MOST DESIRED ADVANCED FEATURES IN MODERN OPERATING SYSTEMS**

Networking along with Internet has completely changed computing scenario in modern times. They have turned the globe into global village. Physical location of data, devices and user of an application are no more required to be confined to single geographical location.

For example, a user in India may have to store his data on three different computers that are placed in three different countries (say America, France, and Australia). With such type of requirements taking place, modern operating system should support following features:

- (i) Seamless Distributed Computing
- (ii) Seamless Distributed Database
- (ii) Global User Management
- (iv) Universal Environment
- (v) Composed Based Operating System.

### **Seamless Distributed Computing**

Seamless distributed computing refers to the feature that if A, B, and C computers are in network and you are sitting on computer B, whenever, you fall short of resources (like CPU time, memory space etc.), operating system should ensure that you are efficiently allocated resources of A and C so that your task is completed effortlessly. This feature of operating system is the demand of the day.

### **Seamless Distributed File System Database**

File systems should allow the user to create cabinets on their computer, in which they set few parameters so that when they use cabinets, files show up there as if they were any other folder. File system should also allow the user to set the scope of the cabinet, local, network or world wide. The physical location of files should be irrelevant. This feature should be part of operating system today.

### **Global User Management**

Operating systems of modern times should have global user management feature built into them, so that when user activates his OS, he should be given a global account where his preferences and other key settings are stored along with the data, which he chooses to store there. In that space, all his e-mails, favorites and other system specific stuff could also be

kept so that all this stuff doesn't become local to the computer, on which he is working today. Tomorrow if he works on other computer, his global stuff should be accessible.

Apart from this, if he is working on other computer, OS should allow him to lift the data from other computer on which he worked previously.

## Universal Environment

It is highly desirable that operating system of modern times should support the feature of Universal Environment so that when a user shifts from his computer to public computer, the same working environment (program setting etc.) is provided to him and his programs work well on other computers also.

## Component Base Operating System

In the era of open system, it is desired that it should be possible for others to modify the OS code, so that its capabilities and services could be enhanced.

## TYPES OF OPERATING SYSTEMS

Various types of operating systems are available for use. For example, MS-DOS, Windows, Linux, Unix etc. are the names, of few popular operating systems.

Although all of them perform above-mentioned management functions but they differ from each other in terms of capabilities, user interface and services that they extend to their users. Operating systems can be broadly classified into following categories:

1. Single user operating systems
2. Multi user operating systems
3. Network operating systems

A detailed description of all the types of operating systems is given below.

### Single User Operating Systems

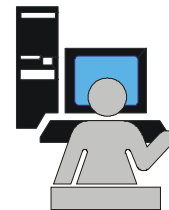
Single user operating systems are those operating systems, which allow only one user to work on the system at a time. In no way, multiple users can work on the system simultaneously. Concept of single user operating system is illustrated in figure 3.5.

Single user operating systems can be broadly categorized into two categories:

1. Single user single task operating systems.
2. Single user multitasking operating systems

Single user single task operating systems allow user to execute one program at a time. For example, if he is preparing a worksheet on computer, he cannot print a report on the printer. As soon as he invokes a program, computer gets dedicated to that task only. CP/M, MS-DOS etc. are few examples of single user single task operating systems.

Single user multitasking operating systems allows user to execute more than one programs at a time. For example, while he is preparing a worksheet on computer, he can print a



**Figure 3.5**

report on the printer and play music too. Practically there is no limit from operating system's side for the number of tasks that can be executed simultaneously. Physical size of the memory (hardware available) puts the limitation. Windows Me, Windows-XP, Macintosh operating system, OS/2 etc are few examples of single user multitasking operating systems.

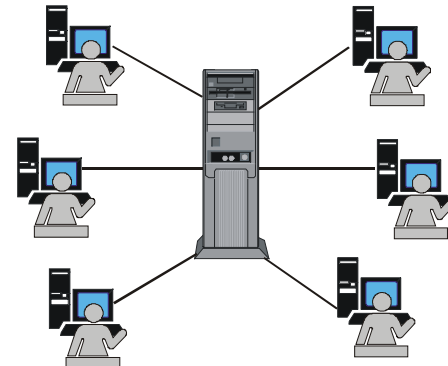
### Multi-User Operating Systems

Multi-User operating systems are larger and more complex operating systems. They allow multiple users to work on the system simultaneously. Concept of multi-user operating system is illustrated in figure 3.6.

Following are the features of multi-user operating systems, which are not provided in single user operating systems.

- Time sharing (CPU devotes time to all the users in round robin fashion).
- Tight security features.
- Resource sharing among users.
- System administrator privileges.

Linux, Unix, VMS etc. are few examples of multi-user operating systems.



**Figure 3.6**

### Network Operating System

When two or more computers are connected to each other with the objective of sharing their resources, they form a computer network. A network operating system is an operating system, which includes special functions, protocols and device drivers for connecting the computers of the network. When a computer is booted with network operating system, all computers get connected together and the network becomes operational. When network becomes operational:

- Security features get implemented
- Devices of one computer can be used by other network users.
- Files can be shared among them.
- They can communicate with each other, sending mail and messages.

Windows-NT, Windows-2000 server, Windows server 3000, Novell Netware, IBM AIX, Red Hat Linux etc. are few examples of network operating systems.

### PC Operating System - DOS

MS-DOS is one of the most popular, powerful and useful operating system. It was designed and developed in the initial days of Personal Computers (PC) by Microsoft Corporation of USA. Due to its versatility and ease of operations, it became quite popular, within short span of time.



MS-DOS is single user single task character user interface (CUI) based operating system. To execute any command in MS-DOS, you need to know the command and its format. Any mistake in its spelling or format leads to error in command's execution.

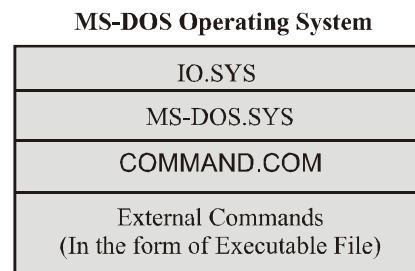
MS-DOS not only activates computer resources and controls them but it also provides many commands for performing day-to-day tasks.

## Architecture Of MS-DOS

MS-DOS is a modular operating system and comprises of many files. It utilizes these files as and when required. Following files put together constitute MS-DOS operating system.

1. IO.SYS
2. MSDOS.SYS
3. COMMAND.COM
4. Many external command files

Basic architecture of MS-DOS operating system is illustrated in figure 3.7 and role of each file is explained below.



**Figure 3.7**

### ***IO.SYS File***

This is one of the most fundamental files of MS-DOS. It gets loaded into computer's memory at the time of booting the system. It primarily activates basic input and output devices like keyboard, VDU etc. and makes them functional.

### ***MSDOS.SYS File***

This file is also one of the fundamental files of MS-DOS. It automatically gets loaded at the time of booting the operating system. It controls internal resources like memory, ALU, Control Unit etc. of computer. When it gets executed, memory, ALU, control unit etc. become functional.

### ***COMMAND.COM File***

This is the third fundamental file of MS-DOS operating system. It comprises of few frequently used MS-DOS commands. When you boot the system, it gets automatically loaded into computer's memory. After booting the system, commands contained in it, remain resident in the main memory. This is the reason, why they are also called internal commands or resident commands. For example, DIR, COPY, TYPE, REN etc. are internal commands of MS-DOS and reside in COMMAND.COM file.

To execute an internal command, you need to type the command from the keyboard in its recommended format. When you do so, it is directly read from the memory and executed. Role and function of commonly used internal command are described later in this chapter.

### **External Commands**

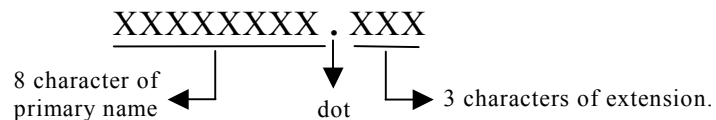
MS-DOS comprises of many external commands. Each command exists in the form of executable file and resides on the disk. For example, FORMAT, XCOPY etc. are the

examples of external commands. They exist in the form of FORMAT.COM, XCOPY.EXE files respectively.

To execute an external command, you need to type the name of the command from the keyboard and press Enter key. When you do so, computer reads the file from the disk, loads it into memory and executes it. When its execution is complete, it is removed from the memory. Role and functions of few external commands are described later in this chapter.

## File Naming Convention

In MS-DOS, file name comprises of two parts. First part is called primary name and second part is called extension. Both the parts remain separated from each other by a dot. Primary name can be at most 8 characters long and extension can be at most 3 characters long. The name can either be written in upper case or lower case letters but operating system stores all the file names in upper case only. As per rules, mathematical signs like +, -, \*, / etc. can not be used in constituting the file name. Following is the general format on MS-DOS file name:

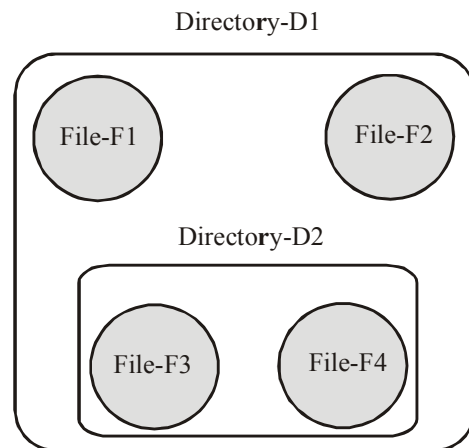


For example, DELL.COM, PLOT.DAT, MONTH12.BAK, YR.AS, RIGHT.DOC etc. are valid file names:

## Concept Of Directory

Directory can be conceptualized as special file, which could hold files and directories in it. Concept of directory is illustrated in figure 3.8. Refer this figure and note that D1 is a directory, which holds two files F1 and F2 in it. It also contains a directory D2 in it. D2 holds files F3 and F4 in it.

From this figure, it is quite clear that directories can be utilized for classified storage of files on the disk. For example, directory named LETTER could be utilized for storing all letters in it. Similarly the directory CPROGRAM could be used for storing all the programs written in C language.



**Figure 3.8**

## Concept Of Root Directory

Root directory can be conceptualized as the top most directory, which holds other directories and files in it.

Whenever you use any disk for the first time, root directory gets automatically created on it. Other files and directories that are created thereafter are created within root directory. In MS-DOS, root directory is denoted by back slash (\) sign.

### Concept Of Parent Directory

Parent directory is the directory, in which you create another directory. For example, if directory D2 is created in directory D1 then D1 directory will be called parent directory of D2. Similarly if directory D3 is created in directory D2 then D2 will be the parent directory for D3. Parent directory is denoted by double dot (..) symbol.

### Current Directory

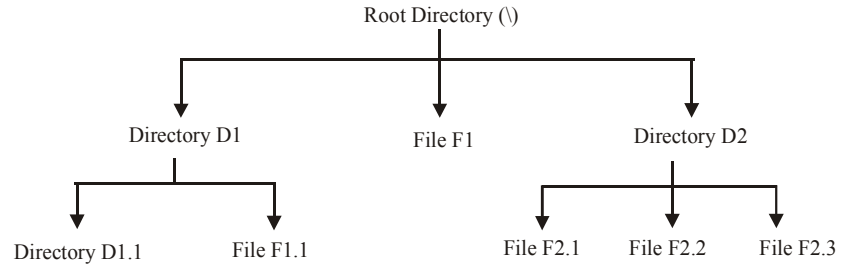
Once you have directories within directory you can always change your position from one directory to another directory. The directory within which you are currently placed is called current directory. For example, if you are currently placed in directory D1 then D1 will be called current directory. When you have moved from directory D1 to D3 then D3 will be the current directory.

### MS-DOS File System

The mechanism of arranging the files and directories on the disk is called File System. In MS-DOS, file system looks like an inverted tree. Root directory appears at the top of the tree. Other directories branch off from there and files act as leafs.

Such a file arrangement is often referred to as hierarchical file system. A hierarchical file system consisting of few files and directories is illustrated in figure 3.9.

Note that root directory is at the top of the tree. Root directory contains two directories D1, D2 and a file, named "File F1" in it. D1 and D2 further contain subdirectories and files in them. Note that directories in MS-DOS follow the same naming convention that files do. Generally the directories are assigned a name, which gives an indication of the type of files contained in them. For example, the name DOCUMENT could be used for storing document files in it. Similarly SALARY directory could be used for storing pay related files.



**Figure 3.9**

### Concept Of Path

Path of a file or directory is the list of directory names in descending sequence, starting from root and each directory name separated by a back slash (\), following which you reach to the desired file or directory. For example, refer figure 3.8. The path for file F1.1 will be \D1\F1.1. Similarly the path name for F2.2 file will be \D2\F2.2. Note that first backslash in the path name denotes root directory, while other backslashes serve the purpose of separators.

## MS-DOS COMMANDS

Following are few commonly used MS-DOS commands:

### DIR Command

DIR command is used for displaying the names of all the files residing on media like floppy hard disk, CD etc. In its simplest form it can be executed in following format:

```
C:\> DIR [Enter]
```

This command will display the names of all the files present on C: disk, in the following format:

```
Volume in drive C is RAMESH
Volume Serial Number is 36F7-808
Directory of C:\
COMMAND    COM           54,645   06-11-99   7:21a
DATA       DAT            732     07-12-99   6:20p
REPORT     DOC           3,210    05-05-98   5:40p
DOIT       BAK            734     05-06-99   2:25a
TOTAL      DAT            351     10-10-99   5:25p
EXAM       LET            357     08-08-99   6:37p
           6 file(s)          60,029 bytes
           18,376,520 bytes free
```

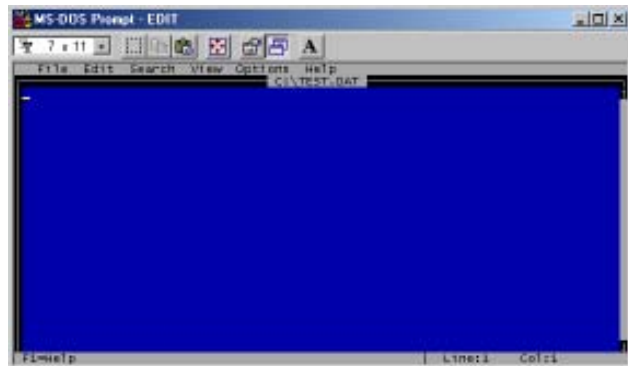
### EDIT Command

EDIT command is used to create a text file and type text in it. It is executed in the following format:

```
EDIT [drive:] [file name] [Enter]
```

Here, in this format, "**drive:**" is the name of that drive, on which the file is to be created and "file name" is the name, by which the file is to be created. For example, following command will create MYFILE.TXT file on default drive:

```
EDIT MYFILE.TXT [Enter]
```



**Figure 3.10**

After execution of this command, a window, as illustrated in figure 3.10 will appear on the screen:

After getting the window on the screen, type the text as per instructions given in the following table:

Sr.No.	Task	Action
1.	Type the text	Use character keys of the keyboard to type the text.
2.	Take the cursor to the desired line and column.	Use arrow keys.
3.	Delete a word	Take the cursor to the beginning of the word and press CTRL and T keys together.
4.	Delete a line	Take the cursor to the line, which is to be deleted and then press CTRL and Y keys together.
5.	Insert text	Take the cursor to the place where text is to be inserted and start typing the text.
6.	Inserting a line between two lines	Take the cursor to the line, which is to be shifted below. After this, press Enter key.
7.	Save the file	Press ALT and F keys together and then press S key.
8.	Come out of EDIT	Press ALT and F keys together and then press X key.

### TYPE Command

TYPE command is used for displaying the contents of a file on VDU. It is executed in the following format:

```
TYPE <file name.> [Enter]
```

Here, in this format, <file name> is the name of that file, contents of which are to be displayed on the screen. For example, if you wish to view the contents of MYFILE.TXT then following command is to be given:

```
TYPE A:TEST [Enter]
```

### COPY Command

COPY command is used to make a duplicate copy of a given file. It is executed in the following format:

```
COPY <Source file name> <Destination file name> [Enter]
```

Here in this format "Source file name" is the name of the file, which you wish to copy and "Destination file name" is the name of the file, in which the contents have to be copied. For example, if the contents of "MYFILE.TXT" file are to be copied in "MYFILE.BAK" then COPY command will have to be executed, as mentioned below.

```
COPY MYFILE.DAT MYFILE.BAK
```

### REN Command

REN command is used for renaming an existing file. General syntax for REN command is as follows:

```
REN <Existing file name> <New file name> [Enter]
```

To understand the usage of REN command, consider the following examples:

```
REN DATA.DAT INFO.TXT [Enter]
```

This command will change the name of DATA.DAT file to INFO.TXT.

## **DEL Command**

DEL command is used for removing a file from the disk. In its simplest form, it can be executed as follows:

```
DEL <File name> [Enter]
```

Here, in this format, "File name" is the name of the file along with drive reference, which is to be removed from the disk. To understand the usage of DEL command, consider the following examples:

```
DEL A:DATA.DAT [Enter]
```

This command will remove DATA.DAT file from A: drive.

## **CD Or CHDIR Command**

CD is short form of Change Directory. It is used for moving the current position from one directory to another directory. General format for CD command is as follows:

```
CD <Directory name> [Enter]
```

Here, in this format "Directory name" is the name of that directory, to which you wish to move. To understand the usage and functioning of CD command, consider the following example:

If current directory has a directory named SECOND in it and you wish to move to that directory then CD SECOND, command will have to be given.

If you wish to move to root directory then CD \ command will have to be given.

If you wish to move to the parent directory then CD .. command will have to be given.

If you execute CD command, without any file name, the name of current directory gets displayed.

## **MD Or MKDIR Command**

MD is short form of Make Directory. This command is used for creating a new directory. It is used in the following format:

```
MD <Directory name> [Enter]
```

Here, in this format, "Directory name" is the name that is to be assigned to the newly created directory. For example, if you wish to make a new directory with the name, "LETTERS", following command will have to be given:

```
MD LETTERS [Enter]
```

Note that when you make a directory, it is made in the current directory

## **RD Or RMDIR Command**

RD is short form of Remove Directory. This command is used for removing the directory from the disk, provided it is blank. It is used in the following format:

```
RD <Directory name> [Enter]
```

Here, in this format, "Directory name" is the name of that directory, which is to be removed. For example, if you wish to remove LETTERS directory, following command will have to be given:

```
RD LETTERS [Enter]
```

## **SYS Command**

SYS command is used to make a media, like floppy, hard disk etc. bootable. While making it bootable, it copies IO.SYS, MSDOS.SYS and COMMAND.COM files at specific location on the media. Note that, since these files are copied at specific location hence the media becomes bootable. On the other hand, if you copy these files to the media, using COPY command, media will not become bootable. SYS command is used in the following format:

```
SYS <Drive name> [Enter]
```

Here, in this format, "Drive name" is the name of the drive that contains the media, which is to be made bootable. For example, if floppy in drive A: is to be made bootable, following command will have to be executed:

```
SYS A: [Enter]
```

## **FORMAT Command**

Format command makes tracks and sectors on the media, like floppy or hard disk. It is executed in the following format:

```
FORMAT [Drive name]
```

Here, in this format, "Drive name" is the name of that drive that holds the media, which is to be formatted. For example, if you execute "FORMAT A:" command then the floppy, present in A: drive will get formatted.

## **MOVE Command**

MOVE command, physically moves files and directories from one place to another. It is used in the following format:

```
MOVE <Source file name> <Destination directory>
```

Here, in this format, "Source file" is the name of the file, which is to be moved from its current location to another directory. "Destination directory" is the name of that directory, in which the file is to be transferred. For example, if you wish to move SUM file into GTOTAL directory of root then following command will have to be given:

```
MOVE SUM GTOTAL [Enter]
```

MOVE command can also be used for renaming the directories, as illustrated in the following example:

```
MOVE JAN MONTH [Enter]
```

Above-mentioned command will rename JAN directory to MONTH.

### **DISKCOPY Command**

DISKCOPY command is used for duplicating the contents of a given floppy. When you make use of this command, all files and directories of one floppy get copied to another floppy. In its simplest form, it can be executed as follows:

```
DISKCOPY <Source drive> <Destination drive>
```

Here, in this format, "Source drive" is the name of that drive, which contains the floppy, whose contents are to be duplicated. "Destination drive" is the name of that drive, which holds the floppy, on which the contents have to be copied. For Example, if you wish to copy the contents from drive A: to B: drive then following command will have to be given:

```
DISKCOPY A: B: [Enter]
```

## **WINDOWS OPERATING SYSTEM**

Windows is the most popular operating system of modern times. It has been designed and developed by Microsoft Corporation of United States of America for Personal Computers.

Windows is single user multitasking GUI based operating system. It not only activates computer and makes its devices functional, but it also provides numerous applications for performing wide variety of tasks.

### **File Naming Convention In Windows**

As you know, file is a medium to store data and information on computer. File is always identified by its name and the same name is used while operating upon it.

Recall that MS-DOS allows maximum 8 characters in primary name and three characters for extension name. Primary name and extension name are always separated by dot (.). The pattern of file names in Windows is slightly different from MS-DOS. Following points apply on file names in Windows:

1. File name can be up to 255 characters long.
2. Blank and dot (.) can also be used in file names. For example "My File" is a valid file name.
3. Characters like + ; [ = ] etc. can also be used in file names
4. Characters like \ / : \* ? " are still prohibited in file names.

### **Concept Of Folder**

Folder is a special file, which is capable of holding other files and folders into it. In MS-DOS operating system they were called directory. In Windows, they are called folders.



## **Features Of Windows Operating System**

Following are the features of Windows operating system:

### **GUI based Operating System**

Windows is Graphical User Interface based operating system. It provides very simple, yet powerful and interesting mechanism for interacting with computer. It is a user-friendly operating system.

### **Multitasking Operating System**

Windows is multitasking operating system. Thus in Windows, you can perform multiple tasks simultaneously. For example, while typing the letter through keyboard, you can view a movie on VDU and print the report on printer too.

### **Drag And Drop**

Drag and Drop is a powerful feature of Windows. Using this feature, you can drag objects like files, folders etc. from their original location and drop them at some other place, with the help of mouse so that they could either be copied or moved there. For example, dragging file A, present in folder F1 and dropping it on folder F2 will move the file A from F1 to F2.

### **CUT COPY And PASTE**

Cut, Copy and Paste is powerful feature of Windows. Using this feature, selected items like text, graphics, icons etc. can either be copied from their original place to a temporary memory location called Clipboard or from Clipboard to the desired location. Thus you can either move these items from one place to other or make duplicate copies of them. For example, when you select an item and perform CUT operation on it, it physically moves from its original place to the Clipboard. When you move to some other location and perform PASTE operation there, the item from Clipboard gets copied to the current location. Thus at the end of CUT-PASTE operation, selected item changes its place. Similarly when you perform COPY operation on a selected item, it gets copied into Clipboard (doesn't get removed from its original place, as it happens in the case of CUT operation). After this, when you change your current location and perform PASTE operation there, contents of Clipboard get copied to the new location. Thus a duplicate copy of the selected description gets made.

### **Object Embedding**

This is one of the most powerful features of Windows operating system. It enables two or more programs to exchange objects like text, graphics etc. among them. For example, a drawing made in Paint program could be brought into the document, created through WordPad program so that figure could be embedded in the text. For example, you may type the description of Kutubminar in WordPad program and may draw the figure in Paint program. Using object embedding feature of Windows, you could place the figure of Kutubminar in Kutubminar text, so that it becomes complete text in itself.

### **Object Linking**

Object linking is yet another powerful feature of Windows operating system. Using this feature, one object can be linked to the other object. Thus whenever linked object is modified or changed modifications/changes get visible in other object also. For example, you may type the description of Personal Computer in WordPad program and draw its figure in Paint program. Using object linking feature, you may link the computer figure to computer description so that it appears in the document (as it did in case of object embedding). Now whenever you will make modifications / changes in computer figure they will automatically get reflected in the description. You may note that overall effect of object embedding and object linking is same but automatic reflection of changes / modifications doesn't take place in case of object embedding.

### **Plug And Play**

It is an important feature of Windows operating system. It makes the operating system, slightly intelligent. Whenever you attach a new device to the computer, operating system automatically senses its attachment and loads its device driver. Thus due to plug and play feature, new devices become automatically operational in Windows operating system.

### **Command Prompt**

Using this feature, Windows provides MS-DOS working environment, within Windows environment. Thus all MS-DOS commands can be executed from Windows.

## **Useful Programs Of Windows**

Windows is a powerful operating system. It not only makes the computer functional, it also provides many useful programs. Using these programs, you can perform different types of operations. Following are commonly used programs of windows:

<b>Notepad</b>	This program is used for creating small text files.
<b>WordPad</b>	This program is used for creating large text files. It also provides many formatting options, using which the document could be formatted and made attractive.
<b>Paint</b>	It is basically a drawing and coloring program. Using this program, you can create shapes and drawings and color them with attractive colors.
<b>Calculator</b>	Using this program you can use your computer as calculator and perform arithmetic and scientific calculations.
<b>Media Player</b>	Using this program, you can play audio and video files on you computer.
<b>Movie Maker</b>	Using this program, you can put graphical pictures in sequence and prepare multimedia presentations.
<b>Windows Explorer</b>	Windows Explorer is a program, using which file and folder maintenance activities are performed on computer. Creating new folders, deleting old folders, moving or copying files from one folder to another are the activities, which are easily performed with

the help of Windows Explorer.

**Internet Explorer** Internet Explorer is basically a browser, using which activities like net surfing, net search, e-mail etc. are performed.

Different versions of Windows are available for use. They all are look-alike GUI based operating systems. They support all above mentioned features and utilities, but differ from each other in terms of their capabilities and additional facilities. Few popular versions of Windows are described below.

## WINDOWS-9X

The term Windows 9x refers to three operating systems viz. Windows-95, Windows-98 and Windows-me.

As the names indicate, Windows-95 was released in the year 1995. It was plain and simple operating system, mainly developed for stand-alone computers. It did not have Internet features and utilities in it. For Internet operations, add-on software had to be installed on top of it. Windows-95 is now obsolete.

Windows-98 was released in the year 1998. It was enhanced version of Windows-95. Internet related aspects were included in it and Internet Explorer, the web browser, was made part of it. It became very popular within short span of time. There are many people who are still using Windows-98 today.

Another version of Windows, called Windows-me was released in the year 2000. Me stands for millennium. It was released as enhanced version of Windows-98 but had many internal problems, due to which it used to frequently crash. Windows-me had improved multimedia capabilities, video editing features and enhanced Internet facilities.

## WINDOWS XP

Yet another improved version of Windows, called Windows-XP was released in the year 2001. It is 32-bit operating system that is quite popular on personal computers and laptops. It is quite stable product and is being continuously used till date. Many variations of Windows XP are there. They are named as Windows XP Professional, Windows XP Home, Windows XP Media center Editing and Windows-XP Embedded. For processors like Opteron operation, Athlon etc, which are 64 bit CPUs, Microsoft has created 64-bit version of Windows-XP to run on them.

Some of the existing features of Windows XP are given below:

1. **Built on the Windows-NT Engine:** It is built on the field proven code of Windows-NT and Windows 2000, which are 32-bit operating systems and support fully protected memory model. Due to this feature, Windows XP is quite stable and provides secure working environment.
2. **Enhanced Device Driver Verification:** When you install a new service on the system, Windows XP tests its driver rigorously. If the driver passes the test, its stability is ensured. This feature makes sure that system remains stable in most of the odd situations.

3. **Windows File Protection Mechanism:** This feature protects core system files from being overwritten by the installation applications. If a file is overwritten, "Windows file protection" feature will restore the correct version of the file.
4. **Preemptive Multitasking Architecture:** Due to this feature, multi-tasking mechanism has been improved in Windows-XP. It now ensures better response and better stability.
5. **Scalable Memory and Processor Support:** Due to this feature, memory up to 4GB and two symmetric microprocessors can be supported in the system.
6. **Improved Protection Mechanism:** Protection mechanisms have been improved at encryption and decryption level and at communication and transportation level also. Thus XP protects the information from hackers to a large extent.
7. **Smart Card Support:** Smart card capabilities have been included in the operating system. It builds faster and easier working environment.
8. **Firewall Enhancements:** To reduce the network risk and build tight security zone, lot of firewall features have been included within the operating system.
9. **Fresh Visual Design:** Although the working environment in Windows XP is quite similar to that of its elder brothers, Windows-9x, but it has a free look.
10. **Rich Digital Media Support:** Windows-XP provides rich digital media support. Its digital media player version 9 is quite powerful and provides facilities for:
  - *view rich media information.*
  - *receive best possible audio/video quality.*
  - *tune to at least 3,000 internet radio stations.*
  - *Create custom CDs that are very fast.*
  - *view DVD movies.*
11. **Integrated CD burning support:** Utilities for writing on CD-R and CD-RW have been incorporated in Windows Explorer of Windows-XP. Now the user need not buy third party software for it.
12. **Dual view:** In Windows-XP, a single computer desktop can be displayed on two monitors.
13. **Enhanced Customization Features:** Rich customization facilities have been incorporated in Windows-XP. Using these utilities, users and administrators can configure, customize and troubleshoot numerous Windows-XP functions.

## WINDOWS-NT

Windows-NT is a 32 bit operating system that supports preemptive multitasking. Preemptive in respect to operating system means the ability of operating system to preempt or stop a currently scheduled task in favor of higher priority task.

Windows-NT is basically a network operating system. There are two versions of NT:

1. Windows NT Server.

2. Windows NT workstation.

A brief description of both is given below.

### **Windows NT Server**

Windows NT Server, as the name suggests, is designed to act as a server in network. It is multi purpose network operating system that integrates variety of network services in it.

Its software tool named, Microsoft management tool, helps in managing network and Internet operations. It supports high security features to safeguard the system from unauthorized users. Strong file protection mechanisms have been built into the operating system to safeguard users files and folders from others.

System policy editor and user profile features allow managing and maintaining user's desktops. System policies can be used to standardize desktop configuration, enforce behavior and control user work environment and actions.

Windows-NT Server's Network Monitor tool enables network administrators to examine network traffic and control it. Strong authentication certificate verification facilities have been built in the operating system so as to make it suitable for digital certificate related operations. Note that such operations are very much required in e-commerce functions.

File related, powerful, features are part of Windows-NT Server operating system. This features enables large data storage and on-line backup facility. The data written on one disk is also written on other disk (data redundancy), so that in the event of one-disk-crash, it could be retrieved from other disk.

On the whole, Windows-NT server is a robust operating system. It enjoyed populating for quite long but now other operating systems from the same manufacturer have replaced it.

### **Windows-NT Workstation**

Windows-NT, as you know is a network operating system. In client server architecture mode of networking, Windows-NT Workstation operating system is for all those computers, which are connected to the network in client mode. In it looks, it resembles Windows-95 or Windows-98 but is an entirely different operating system. Being part of Network environment, it has tight security features and network features incorporated in it. It promotes distribute data processing as well as stand alone mode of operations.

Note that with the advent of Windows-2000, Windows-NT server and Windows-Workstation operating systems, both are almost obsolete now.

### **WINDOWS-2000**

Windows-2000 operating system came as replacement of Windows-NT. It is basically GUI based network operating system. It has been designed for uniprocessor and symmetric multi-processors based computers. It is 32-bit operating system. Its working in it environment looks like its elder brothers, Windows-NT, Windows 9x etc. As the name indicates, it was released in the year 2000. Its four version are:

1. Windows-2000 Professional.

2. Windows-2000 Server standard edition.
3. Windows-2000 Advanced server edition.
4. Windows-2000 Data center server.

Windows-2000 Professional is Microsoft's mainstream desktop operating system for business of all sizes. It provides high level of security, state-of-the-art features for mobile users and enhanced throughputs. In its capabilities, it falls a bit lower than Windows-2000 server edition.

Windows-2000 Server standard edition is an operating system for network servers. It suits well for business of average size and the computers with maximum 2 processors.

Windows-2000 advanced server edition is a powerful operating system. It has been designed for multiprocessor computers, which have up to 4 microprocessors in them. It provides enhanced memory support and more rigorous printing facilities for great print load operations. Additional features for network balancing have been incorporated in this version.

Windows-2000 Data Center server is the most powerful operating system of this series. It has been designed and developed for high-end voluminous data handling operations. It is capable of handling up to 32 processor based computers.

Windows-2000 is known as hybrid kernel operating system. Architecturally it is divided into 2 modes:

1. User mode
2. Kernel mode

Kernel mode provides unlimited access to system resources and facilities, while user mode is heavily restricted mode. All the versions of Windows-2000 look alike in their looks and provide common functionality. They also support Windows-NT file system, called NTFS 5. It is a robots operating system and is quite popular.

## **LINUX**

Linux is basically multi user, multitasking operating system. It provides character user interface and graphical user interface both for interacting with computer.

It was originally designed and developed by Linux Benedict Torvalds in the year 1991. Basic objective behind developing Linux was to bring out an operating system, which was low in cost and had the power of UNIX operating system. Linux got his operating system included in GNU project of Free Software Foundation, to make it available free of cost, all across the world. Its core version is available free of cost to everyone. Many software-developing companies have incorporated many functionalities into it and are marketing it. Red Hat's Linux is one such operating system and many more also exist.

Linux also has powerful networking features incorporated into it and has built in Internet facilities.

Linux has gained popularity these days and is emerging as a parallel competitor of Windows and Unix operating systems.

Linux operating system provides both types of user interface. It supports CUI and GUI both. Graphical Interface of Linux provides windows look alike working environment. Features like drag and drop, Cut and paste, file sharing, multitasking etc. are also available in Linux.

Character User Interface of Linux is really powerful and provides thousands of commands for doing wide variety of tasks. Using Linux's meta language and shell features, many commands can be coupled together and new commands can be formed. Following are few Linux commands, which are used in day-to-day functions:

- ls** : This command displays the names of all the files present in current directory.
- cat** : This command displays the contents of a file.
- cp** : This command copies the contents of a file into another file.
- mv** : This command moves a file from one directory to another directory.
- mkdir** : This command makes a new directory.
- rmdir** : This command removes a blank directory.
- cd** : Using this command, user can move from one directory to another.
- pwd** : This command shows the name of current directory.
- vi** : Using this command, a new file can be edited and text written in it.
- lp** : This command prints a file on the printer.
- passwd** : This command is used for changing the password.
- chown** : This command changes the ownership of a file.
- chmod** : This command changes file permissions.
- who** : Names of all current users get list through this command.
- ps** : Names of all processes, currently running on the system get listed by this command.
- find** : This command is used for finding, if the file of given name is present on the disk or not.
- grep** : This command is used for searching the occurrences of a given string in a file.
- sort** : This command sorts the given contents either in ascending or descending order.
- write** : Using this command one user can send text message to other user, who is currently on-line in multi-user environment.
- mail** : This command is used for sending e-mails to other users of the system.

Linux is a powerful operating system, which is getting more and more popular every day. Most of the hardware vendors have started bundling their products with Linux. Large

population of Personal Computers (PC) and Laptops comes with preloaded Linux, these days. It is likely to gain more popularity in coming future.

## **WHAT IS BOOTING?**

The process of loading the operating system in computer's memory is called booting. When you switch on the computer, it reads a special program, called bootstrap program from ROM and execute it. On its execution, it carries out a self-test. During self test all the peripherals and devices of computer are checked. If any fault is found in them a corresponding errors message is displayed on the monitor and booting process stops. On the other hand, if no peripheral is found faulty, operating system is read from the disk and loaded into computers memory. At the end of booting process computer becomes ready for accepting commands, executing them and displaying result. Booting is the first and foremost task that is to be performed when computer is to be used.

Note that through tunable parameters, booting device searching sequence can be set for the computer. Once this sequence is set, computer looks for operating system on the devices mentioned in device searching sequence. For example, if the booting sequence has been set as hard disk, CD drive and floppy drive then first computer will search the operating system on hard disk. If it gets it there, it will load it in computer's memory. If it doesn't get it there, it will search it on CD drive. If it gets it there it will load it else it will search the floppy drive. If it doesn't get it on any of the drives, it will display corresponding error message. As mentioned above, this booting search sequence can be changed as per requirements.

## **WHAT IS SHUTDOWN?**

The process of switching the computer off is called shutdown. The procedure for shutdown varies from operating system to operating system. During shutdown, computer stops all running processes, saves current settings, closes all opened files and disconnects from all the links.

# **SUMMARY**

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*Operating System is the most essential software for the functioning of computer. It activates all the units of computer and makes it capable of accepting commands from the users and executing them. Without operating system, computer cannot work.*

*Before starting any work on computer, operating system has to be loaded in computer's memory. The process of loading the operating system in computer's memory is called booting.*

*Prime responsibilities of operating system are:*

- 1. Performing internal management functions.*
- 2. Providing services.*
- 3. Providing user interface.*



Following are internal management functions that are performed by the operating system:

1. Process management functions
2. Memory management functions
3. Information management functions
4. Device management functions

Services of operating system are basically the commands and applications, using which various types of tasks are performed on computer. They are part of operating system.

User interface is basically the style, in which user has to interact with computer. Generally it is of following two types:

1. Command Line Interface (CLI).
2. Graphical User Interface (GUI).

In command line interface user interacts with computer through textual commands while in graphical user interface he interacts through graphical objects like icons, menus, dialog boxes etc.

Easy to use, reliability, speed and efficiency, reusability, security, adaptability, compatibility, multi media support etc. are few most desirable characteristics of operating system.

Operating systems can be broadly classified into following categories:

1. **Single user operating systems:** Single user operating systems are those operating systems, which allow only one user to work on the system at a time. MS-DOS, Windows etc. are examples of single user operating systems.
2. **Multi user operating systems:** Multi user operating systems allow multiple users to work on the system simultaneously. Linux, UNIX etc. are examples of multi-user operating systems.
3. **Network operating system:** A network operating system is an operating system, which includes special functions, protocols and device drivers for connecting the computers of the network. Windows-NT, Windows-2000, Windows-3000 etc. are examples of network operating system.

## EXERCISES

## CHAPTER 5

### Short Type Questions

**A. Select best possible options for following questions:**

1. Which software activates the computer?
 

(a) Commands	(b) User Interface
(c) Operating System	(d) Utilities

2. What is booting?  
(a) Carrying out a self test      (b) Loading operating system in computers memory  
(c) Checking computers memory      (d) Executing a command
3. Which of the following management function is not performed by operating system?  
(a) Information management      (b) Software management  
(c) Device management      (d) Memory management
4. Which of the following is single user multitasking operating system?  
(a) MS-DOS      (b) Windows-XP  
(c) Windows-2000      (d) Unix
5. Which of the following is not a GUI component?  
(a) Radio button      (b) Menu  
(c) Command      (d) Text box
6. Which type of user interface does MS-DOS provide?  
(a) GUI      (b) CUI  
(c) ABI      (d) MGI
7. Which type of user interface is provided in Windows-XP?  
(a) GUI      (b) CUI  
(c) ABI      (d) MGI
8. What that feature is called, which permits a user to execute multiple programs simultaneously?  
(a) multi user      (b) multi tasking  
(c) multi programming      (d) multi process
9. Maximum how many options can be selected from a radio button list?  
(a) As many as required      (b) all the option present in list  
(c) 1      (d) 0
10. Maximum how many options can be selected from a check box list?  
(a) As many as required      (b) all the option present in list  
(c) 1      (d) 0

**B. Fill in the blanks:**

11. .... is the software, which enables the computer to perform read / write functions.
12. That user interface, in which user interacts with computer, using commands is called .....
13. That user interface, in which user interacts with computer, using graphical items is called .....
14. .... is an example of network operating system.

15. .... is an example of multi user operating system.
16. GUI is acronym for .....
17. .... command of MS-DOS will be used to view the names of all the files present in current directory.
18. Directory in MS-DOS serves same purpose, which ..... does in Windows.
19. In Linux ..... command is used for creating a new directory.
20. In MS-DOS ..... command can be used for viewing the contents of a file.

**C. State true or false:**

21. The term, Windows-9x is used as common name for Windows-2000, Windows-3000 etc.
22. MS-DOS is single user, multi tasking operating system.
23. Windows is single user multi tasking operating system.
24. Unix provides CUI interface to interact with computer.
25. Process management function is one of the responsibilities of operating system.
26. Multi-user operating system and Network operating system, both, provide the facility that multiple users could use the same system.
27. Windows-2000 is an example of multi user operating system.
28. In GUI, user has to type command for interacting with computer.
29. Writing data and reading it are the activities, which fall into the category of memory management that operating system performs.

**D. Answer the followings question in short:**

30. In which type of user interface, user has to type the command to interact with computer?
31. In which type of user interface, user has to interact with computer through graphics and pictures?
32. Name at least four types of management functions that operating system performs.
33. Name any two operating systems, which are multi-user operating systems.
34. Name any three operating systems that are network operating systems.
35. Name that program of Windows, using which small text files are created.
36. What do you call that software, which activates computer?
37. What do you call that process, which loads the operating system into computer's memory?
38. Name any five GUI components that are generally provided in any GUI based operating systems.
39. What does the term Windows-9x signify?
40. What is Windows-NT?

**Detailed Answer Type Questions**

**E. Answer the following questions in detail:**

41. What is operating system and what is its purpose? Name any four popular operating systems?
42. What do you understand by following? Explain them in brief, giving a suitable example:  
(a) Process management function. (b) Information management function
43. What is booting? Why it is required?
44. What is the function of following MS-DOS commands? What are their equivalent commands in Linux?  
(a) DIR (b) CD (c) TYPE (d) COPY
45. How MS-DOS is different from Window? Give at least four arguments.
46. Describe multitasking feature? What is plug and play feature of Windows operating system?
47. What do you understand by multi user feature of operating system? Name any two operating systems that support this feature.
48. What is CUI interface? Explain it by giving a suitable example.
49. What is GUI interface? Explain it by giving a suitable example.
50. Describe at least three features of multi-user operating systems. How multi-user operating systems are different from network operating systems?
51. Describe object embedding features of Windows.
52. Describe object linking feature of Windows.
53. Differentiate between object embedding and object linking features of windows.
54. Describe cut, copy and past features of Windows.
55. Explain at least 5 new features of Windows-XP.
56. Describe at least 5 most desirable features of operating system.
57. What do you understand by reliability and adaptability of operating system.
58. Describe similarities and differences in file naming conventions of MS-DOS and Windows.
59. What is directory? What are its advantages? Name any three directory related commands of MS-DOS.
60. Describe at least three features of Windows. Name any three applications of Windows and their uses.

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# Computer Application Theory

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## CHAPTER 4

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### *Computer Communication*

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#### INTRODUCTION

Communication is the basic requirement of mankind. If people are nearby they communicate verbally. If they are far away, they adopt some means for communication. For example, in ancient days people used to light fire and blow smoke or beat drums for giving signals of their well being to their friends and relatives, who lived at some distance from them. When man became bit civilized, he moved to more distantly located places, places where smoke signals or drum sounds could not reach. So he started sending messages through pigeons or human-runners.

Later when distances between people became large, services like Post and Telecommunication came into existence for communicating with others. Both the services exist even today. No doubt these services are quite useful but they have their own disadvantages. Postal service is quite slow. For example, a letter sent from India to USA may take 15 to 20 days. By the time it reaches its destination, complete scenario changes. In addition to this, letters get lost in transit. On the other hand, telecommunication services are fast but are limited to voice chat only. Articles like documents, letters etc. cannot be transferred through this service. In addition to this, it is a costly service. In spite of so many disadvantages, Post and Telecommunication services enjoyed their popularity for many decades, as there was no substitute for these services.

With the advent of computer networking technology and popularity of Internet, computer communication emerged as substitute for both the services. It works as base line for many new services, which have come into existence recently. Electronic Data Interchange (EDI), E-Commerce, Electronic Fund Transfer etc. are the latest services, which have completely changed the working methodologies of many organizations and have brought revolution in the society. All these services make use of computer communication. All important aspects related to computer communication are described in this chapter.

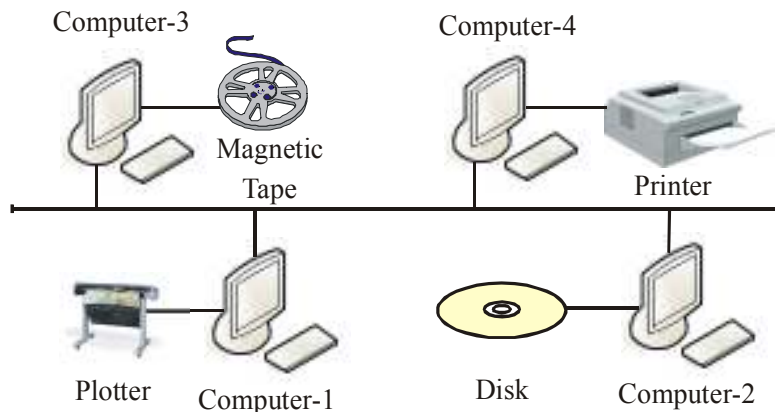
#### INTRODUCTION TO NETWORK

When two or more identities of similar type, work in coordination with each other,

performing similar types of tasks, they form a network. For example, when sales executives of an organization work together to sell the product of the company, they form company's sales network. Similarly when two or more computers are connected together to work in coordination with each other they form a computer network.

To form a computer network and establish coordination among the computers of the network, certain hardware and software elements need to be present in the network. For proper communication among them, certain rules of communication, called protocol, need to be established.

Resource sharing and instant data communication are the immediate results of a computer networking. Advantages of these two simple-looking factors are so many that in short span of time numerous computer networks have come into existence and millions of applications have been developed around them.



**Figure 4.1**

What computer network is, in what form its computers are arranged in the network, what protocols are used to establish communication among them, and what type of services are available on computer networks, are the issues, which are described below.

## WHAT IS COMPUTER NETWORK

When two or more computers are connected together with the objective of communicating with each other and sharing their resources, they form a computer network. A simple computer network is illustrated in figure 4.1.

Refer figure 4.1 and note that 4 computers are connected together to form a computer network.

In this network, any computer can communicate with any other computer. For example, computer-1 can send message to computer-4 and computer-4 can reply back. Similarly computer-2 and computer-4 can exchange data among them.

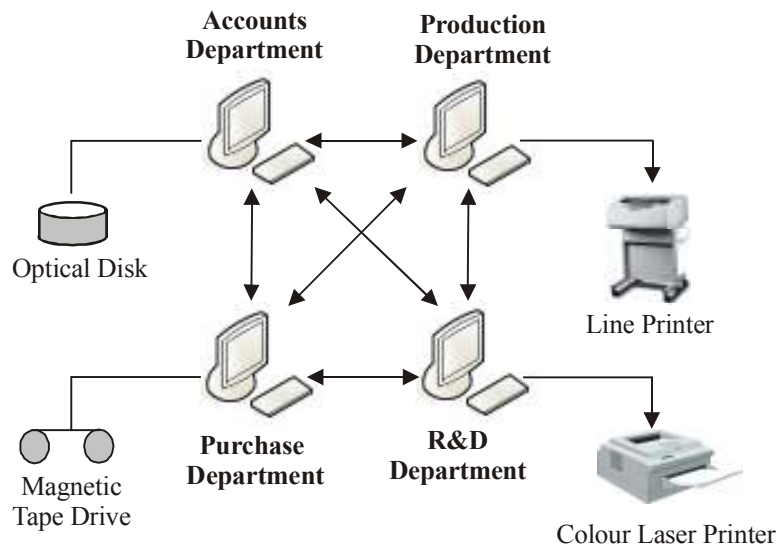
In computer network, computers share their resources among them. For example, computer-3 can print its documents on the printer attached to computer-4. Similarly computer-1, computer-3 and computer-4 can store their data on computer-2's disk.

## REASONS FOR NETWORKING

There are many factors that have brought computer networking into existence. These factors are described below.

## To Share Distant Devices

Although the cost of low end computers has drastically reduced but the prices of high end computers and some of the peripherals are still very high. For example, magnetic tape drives, optical disks, line printers, color laser printers etc. are still priced high. It is quite obvious that they cannot be purchased for every individual computer of the organization. If it is done so, it will be highly uneconomical proposition. Best means for making these costly devices available to each computer, is to network the computers and allow the users (of other computers) to use them through network. The concept of distant device sharing is illustrated in figure 4.2.



**Figure 4.2**

Figure 4.2 clearly shows that departments have purchased costly items such as optical disk, color printer etc. as per their own internal requirements. But their use is not limited to their departments only. Users of other departments can also access them over the network. For example, Production department does not have a color laser printer but can print its colored pictures on R&D's color laser printer by accessing it through network. Similarly R&D department can access optical disk of Account's department for either storing or retrieving its files.

## To Share Software of Other Installations

If an organization has multiple locations then multiple copies of the software need not be purchased and installed at every location, instead a single copy can be purchased and installed at one computer and made accessible to the users of other computers also. This would not only save the cost but save the disk space also.

## To Share Data Of Other Installations

As described above, when you wish to access data of other computers, on-line, you have to

network the computers. For example, a computer based at Delhi railway reservation cell may have reservation related data of all the trains that originate from Delhi.

Similarly Mumbai railway reservation cell may have reservation related data for all the trains that originate from Mumbai.

Railway reservation software may use this information to book the seats for the passengers locally i.e. people based at Delhi can book their seats in the trains that originate from Delhi. Similarly Mumbai people may be able to book their seats in the trains originating from Mumbai. But if they wish to provide return reservation facility (i.e. person sitting at Delhi is able to book the seats in the trains originating from Mumbai) then both the computers have to be networked. Concept of remote data access is clearly shown in figure 4.3 and 4.4.

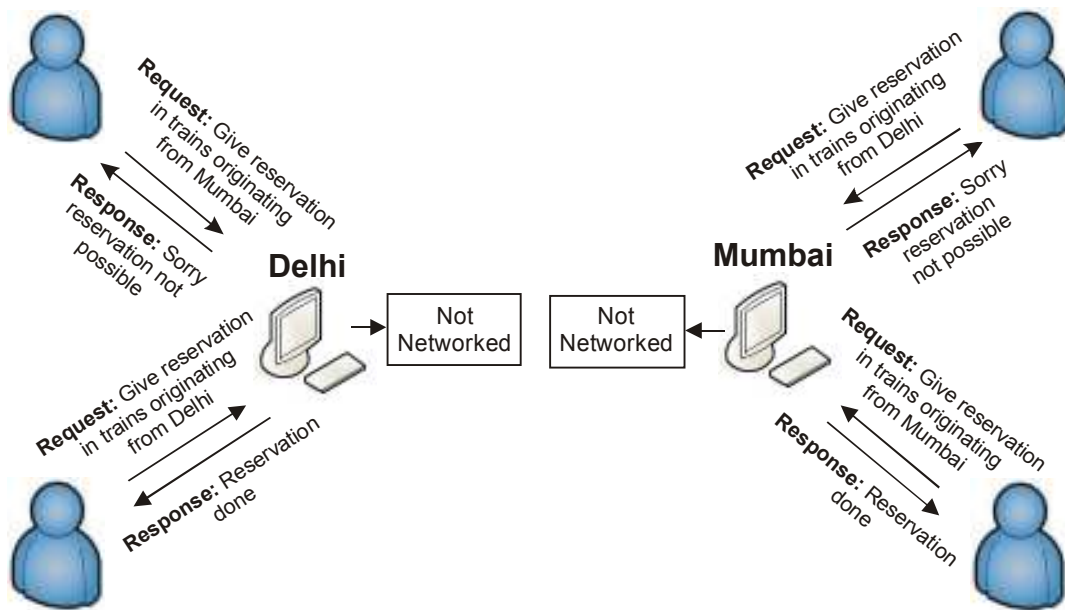


Figure 4.3



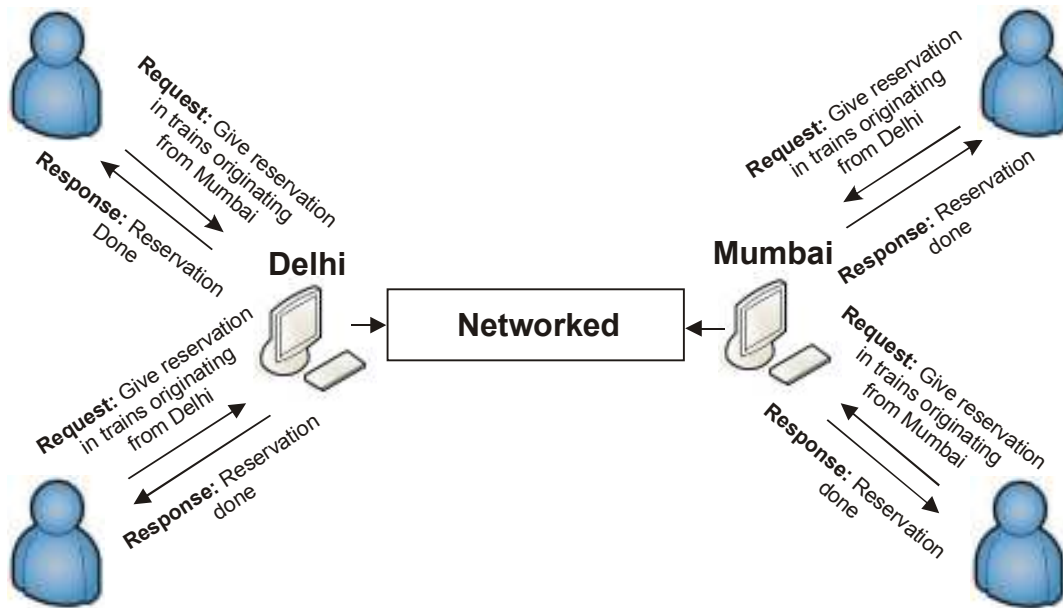


Figure 4.4

### To Provide a Communication Medium

When the users are situated at different locations, they need to communicate with each other for various reasons. When computers are networked, users of different computers can send messages to each other and communicate. Electronic Mail is an example of network applications that saves cost and time, both. Chat or video conferencing can also be held among the users of network.

### To Evenly Distribute the Load of Processing

When the total job volume is high then it is better to distribute the work and interconnect the sites so that the job volume is evenly distributed and there is no problem in handling the resources. For example, one computer may be completely dedicated to data entry, another may be dedicated to data processing, and the other may be dedicated to data analysis and printing. To run the jobs in parallel they may be networked together.

## APPLICATIONS OF NETWORK

As you know, data communication and resource sharing are the two prime outcomes of computer networking. Taking advantages of these two outcomes computer network serves as base line for many applications. Many products and services that have come into existence in recent past make use of computer network. Few famous applications of computer network are described below.

## **Rail/Air Reservation System**

Railway department has its own computer network. All major cities of India are connected together through this network. For example, railway computers of all major cities like Delhi, Mumbai, Kolkatta, Chennai, Bangalore, Madurai, Hyderabad and many more are networked together for data communication and resource sharing.

Rail reservation system has been developed for railway computer network. Since all the computers are connected together hence they can share train related data among them. For example, computer at Chennai can read, write and delete data that is present on Mumbai computer. This is the reason why back reservations can be done and tickets printed for the journey from Mumbai to Chennai, sitting at Chennai (in fact for any train from any city that is on railway network). Similar types of reservations are done for flights, all across the globe. For example, I can book a ticket in a flight that originates from France and goes to New York, sitting in India.

## **Internet Banking & ATMs**

There was a time when banking operations (like depositing and withdrawing money from account) were quite local to the city, in which the customer had his account. For example, it was not possible for any customer to withdraw money from his Delhi bank account, while he was in Chennai. But now computer network has made this possible.

Computers of all major banks in all major cities are networked together. Automatic Teller Machines (ATM) are also connected to network. May customer's account be anywhere, it can be accessed from any part of the country (some privileged accounts can also be accessed from any part of the world) and money transactions be done.

Due to networking outstation cheques are cleared in a day or so. Accounts are settled within few hours.

## **E-Mail**

Electronic mail is one of the most popular applications of computer network. Using this application, letters, document, reports etc. are exchanged between people, over network. The biggest advantage of e-mail is that the sent articles reach their destination within few seconds. In addition to this, they do not get lost in transit.

## **Information Sharing Applications**

Many organizations, libraries, universities, scientific labs etc. have their own computer networks. Using network they share information with each other. For example, library networks allow librarians to search the availability of a book in other libraries that is in demand and is not present in their library.

Similarly computer networks of universities provide facilities and means for gathering information on research papers, journals, and published articles, which are available in other universities.

Offices and organizations that have their own computer network, (computer of which may

be in the same premises or different cities or countries), share official information through computer network. Managers pass instructions to their subordinates through computer network. All required data or reports are transacted through computer network.

### **Education And Examinations**

These days, computer networks are being used for providing distant education through on-line classes and conducting remote examinations. Education provider may be distantly located but he makes his presence at many places through networked computers.

Classes, course material, exercises and examination papers etc. are made available centrally at one place. Other users access them through network and use them for their benefit. On-line universities are example of this application.

### **Network Games**

These days, many computer network games are available, in which distantly located network users play a common game. Imagine a car race game, in which persons located in Chennai, Mumbai and Delhi participate in a car race and try to compete with each other to win the race.

## **BENEFITS OF NETWORKING**

By inter connecting the computers in the form of network; you draw lot of advantages, which otherwise, in central or decentralized type of setup, are not possible. A list of important advantages of networking is given below.

1. By networking the computers, you can access the information, available at distant locations within no time, which otherwise would have not been available so quickly and effortlessly.  
By having fast access to the data/information you can react fast to the on-going problems and take fast decisions and save time, money and energy.
2. You can share costly devices and thus cut upon cost and utilize the resources in much better and effective way.
3. You can keep the work going, even if one of the computers is not working. If one computer is down, you can use another computer till the time fault is corrected. Thus by networking the system you are able to utilize the time and resources in very effective way.
4. You can design much better applications, which provide great help and services to its users. For example, only due to networking it has been made possible to book the air or railway tickets for any destination from any city present on the network.
5. You are able to communicate with other users in much better way. For example, even if the user is not available on-line, you can send him mail, which gets stored in his mail box. When he logs on and starts using computer, he is informed of new mail arrivals so if he wishes he can look into those letters.
6. An on-line advice can be sought from the experts for solving the current crisis, for which you do not have ready-made solution with you.

## TYPES OF NETWORKS

Computer networks are broadly classified into two categories:

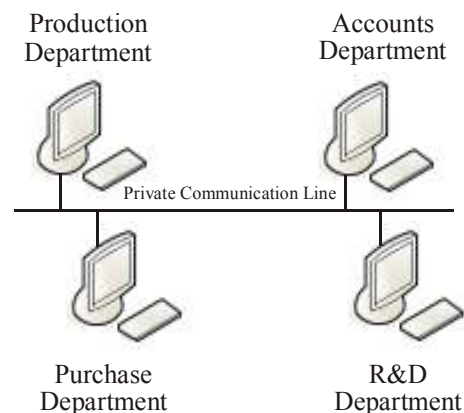
1. Local Area Networks (LAN).
2. Wide Area Networks (WAN).

Other networks are variations of these two networks. A detailed, description of both types of networks is given below.

### Local Area Network

Local area networks are the networks that spread within a short distance of a kilometer or so and are generally confined to a building or a campus. For example, computers of various departments of an organization that confine within the factory building itself, if connected together, will form a Local Area Network.

The data transfer speed of Local Area Network is generally high i.e. large amount of data can be transferred from one computer to the other in a very short span of time. Roughly the data transfer rate in LANs is generally of the order of Mega bits per second (MBPS). In Local Area Networks you connect the computers using dedicated wires of your own which are only used for transferring the data/information and are not used for any other purpose. Since these communication lines run, in private, undisturbed area hence LANs are relatively error free. (For example, 1 bit error in  $10^9$  bits transmitted). A rough sketch of Local Area Network is illustrated in figure 4.5.



**Figure 4.5**

### Wide Area Networks

Wide Area Networks or WAN are the networks, in which computers are spread over long distances (more than a kilometer). Computer of Wide Area Network could either be in different countries, cities or localities. Since they spread over wide geographical area hence you cannot connect them through your own lines. You have to take help of the connections, which already exist in one form or the other. For example, telephone connection is one type of link that is already available in ready-made form. It can be used to connect the computers, which are far apart. Similarly microwave link and satellite link are other types of links that can be used to connect the computers that are in remote locations or are situated across the countries.

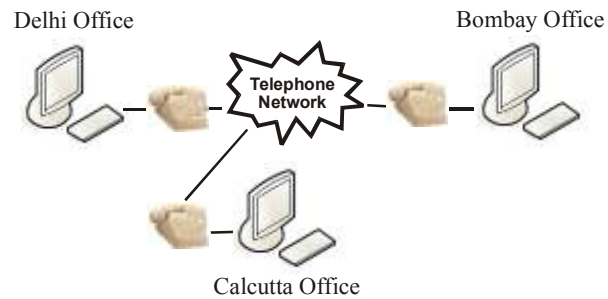
Note that these ready-made links were originally designed for some other purpose not for connecting computers, so their transfer speeds are not as high as that of dedicated lines (LAN lines). Roughly their speed is of the order of few Kilo bits per second say 32 Kbps or 64 Kbps.

Since these lines run into noisy environment where humidity, heat and electrical signals cannot be controlled hence Wide Area Networks are more error prone than Local Area Networks (For example a

bit error rate of 1 in 100,000 bits transmitted). A rough sketch of Wide Area Network is illustrated figure 4.6.

## VARIATIONS OF LAN AND WAN

Various variations of Local Area Network and Wide Area Network exist with different names. Some of them are described below.



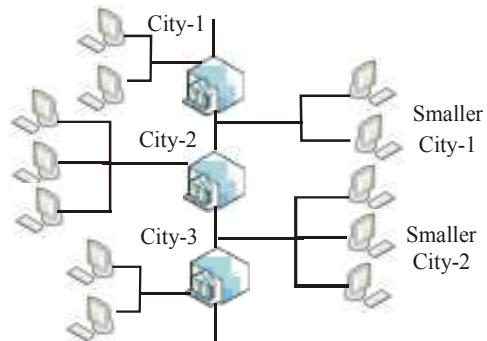
**Figure 4.6**

### Campus Area Network (CAN)

When the computer of various departments of an organization, such as factory, college, university etc. are connected together. They form Campus Area Network or CAN in short. Since computers of Campus Area Network remain confined within the campus boundary (which is short) hence they fall into the category of LAN.

### Metropolitan Area Networks (MAN)

Metropolitan Area Networks are basically Wide Area Networks, which connect computers of larger cities. They are generally high-speed networks and work as backbone for connecting other local area networks (say smaller cities, which are located between two big cities of MAN). A block diagram of Metropolitan Area Network is shown in figure 4.7.



**Figure 4.7**

### Home Area Network (HAN)

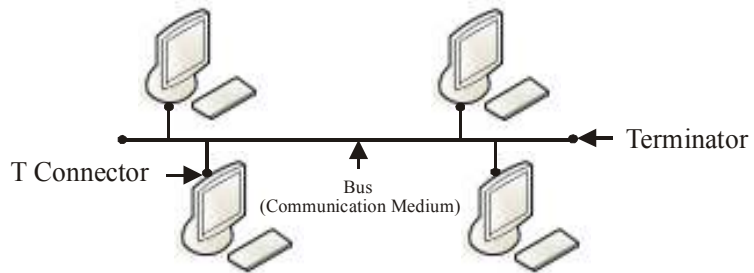
When two or more computers located within a house are networked together, they are given the name Home Area Network or HAN in short. Obviously HAN falls into the category of Local Area Network.

## NETWORK TOPOLOGIES

Topology is basically the physical arrangement of computers in the network. There are various topologies, suggested for computer networks. Each topology has its own advantages and disadvantages. One topology suits well for one set of given conditions while the other doesn't. Some of the topologies undergo network expansion easily while other may require complete overhauling. A complete overview of most commonly used topologies is given below.

## Bus Topology

In bus topology, all the computers and devices of the network are connected to common medium (cable). Both the ends of the medium are terminated by a special device called terminators. Computers are connected to the cable, using other device called T connector. Block diagram of bus topology is illustrated in figure 4.8.



**Figure 4.8**

## Functioning

Any computer that wants to communicate with other computer includes its address in the message and transmits it on the medium. Every computer receives the message. If any computer finds its own address in the message, it picks up the message else it rejects it. In this way, the communication takes place between the computers of the network.

## Advantages

Following are the advantages of bus topology:

1. It requires shortest length of wire to connect the computers of the network in comparison to the wire required in other topologies.
2. Adding and removing the computers in the network is easy. It does not affect other computers of the network.
3. Even if one computer of the network becomes down, it doesn't affect the functioning of other computers. The network keeps on functioning.

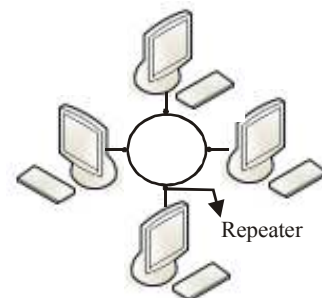
## Disadvantages

Following are the disadvantages of bus topology:

1. Terminators often malfunction, due to loose connections.
2. A failure in the cable makes the entire network down.

## Ring Topology

In ring topology computers of the network are connected to each other in circular fashion. The first computer is connected to the second computer, second is connected to the third and so on and the last computer is connected to the first computer, so as to complete the circle. Computers of the network are connected to the cable, using a special device called repeater. A computer network, in ring topology is illustrated in figure 4.9.



**Figure 4.9**

### Functioning

In this type of topology, a bit pattern, called token, keeps on moving from one computer to another in circular fashion. Only that computer, which has the token, is allowed to transmit the message.

Transmitting computer introduces destination computer's address in the message and pushes it on the medium. The message moves forward in one direction, on the medium. When a computer receives the message it checks the destination address. If the destination address matches with its own address it picks up the message else it rejects it.

After transmitting the message on the medium, computer passes the token to next computer to communicate.

### Advantages

Practically there are no highlights of this topology but there are lots of disadvantages.

### Disadvantages

Following are the disadvantages of ring topology:

1. Malfunctioning in any of the repeater or cable makes the entire network down.
2. Addition and removal of computers in/from the network is a difficult task.
3. Long cables are required to connect the computers.
4. This type of network cannot be expanded beyond a limit. Not many computers can be added in this arrangement.

### Star Topology

In star topology, computers of the network are connected together through a special device called hub. Each computer is connected to the hub. Thus the link of one computer is established with other computers via hub. A computer network in star topology is illustrated in figure 4.10.

### Functioning

Hub in this topology works as intelligent switch. When a computer wish to transmit a message it introduces destination computer's address in it and pushes the message, on the link, that joints it to the hub.

On receiving the message, hub checks the address and routes it to the computer, to which the message has been sent. In this way, proper communication between the two computers of the network gets established.

### Advantages

1. Hub provides mechanism for connecting many computers to the network. So

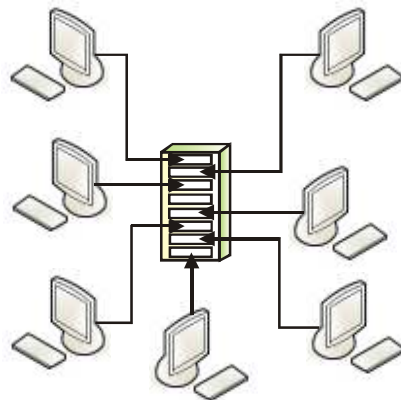


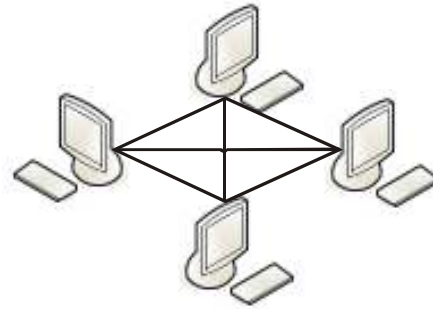
Figure 4.10

expansion of the network becomes very easy, if a slot is vacant in the hub. If all the hub slots are occupied then another hub can be added into the network, so as to make provision for many more new slots. Thus network growth doesn't have any limitation in this type of topology.

2. If the link between the hub and a computer is down then it doesn't effect the functioning of other computers of the network. Rest part of the network works fine.
4. All the hubs generally have a status light for each link. Glowing light of a link indicates that the link is working fine. Thus identification of malfunctioning link, in this topology, becomes very easy.

### Mesh Topology

In mesh topology each computer of the network remains connected with other computers through dedicated medium (wire). A computer network, in mesh topology, is illustrated in figure 4.11.



**Figure 4.11**

### Functioning

Since direct path to every computer exists in this topology hence computer sends the message directly to the required computer.

When the link to a destination gets broken, computer sends the message to another computer introducing the address of the destination computer. On receiving the message, receiving computer directs it to the computer, to which the message belongs.

### Advantages

Following are the advantages of mesh topology:

1. Due to direct connection between the computers, no switching is required. This makes the network very fast.
2. If one link gets broken, the data is routed through other links. Thus network seldom remains down.

### Disadvantages

Following are the disadvantages of Mesh topology:

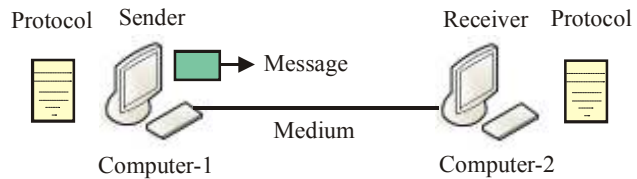
1. It doesn't suit well for large number of computers.
2. Very large length of cable is required to connect the computers, so the cost turns out to be very high.
3. This topology is almost obsolete now.

## NETWORKING BASICS

Basic model of network communication is illustrated in figure 4.12. It shows that network comprises of following essential components:



1. Sender
2. Receiver
3. Medium
4. Message
5. Protocol



**Figure 4.12**

A brief description of each component is given below.

### Sender

The computer, which sends the message (or starts the communication) is called sender. For example, if computer-1 sends message to computer-2 then computer-1 will be termed as sender.

### Receiver

That computer of network, which receives the message is called receiver. For example, if computer-2 receives the message sent by computer-1 then computer-2 will be termed as receiver.

### Medium

Medium is basically that substance through which message propagates and reaches the destination (receiver). For all practical purposes, medium could be of following two types:

1. Wired medium.
2. Non-wired medium.

Depending upon various factors, such as distance, type of message, price etc. communication medium may vary from network to network. A brief introduction of both types of medium is given below.

### Wired Medium

When a cable is used for physically connecting the computers of the network the medium is said to be wired medium. Following types of cables are generally used for connecting the computers of the network.

#### Twisted Pair Cable

Two independently insulated wires twisted around one another form twisted pair cable. Often both the wires are encased within plastic case. Wires pick up electromagnetic signals from the atmosphere and thus noise gets created in the signal, passing through the wire. When two wires are wound over each other, noise in one wire destroys the noise in other. Thus twisting of wires helps in reducing cross talks. It is the cheapest cable. It can support up to 1Gbps data transmission speed. Twisted pair cable is illustrated in figure 4.13(a).

#### Coaxial Cable

Coaxial cable is basically a conducting wire surrounded by insulation material, like hard

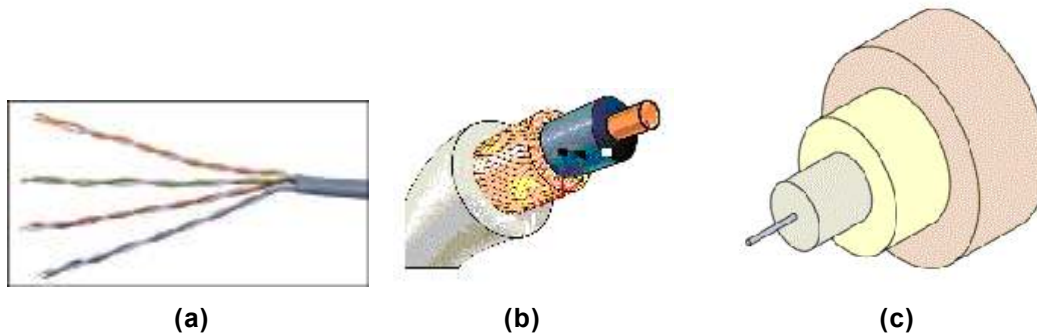
plastic. Conducting sheath surrounds this assembly and the whole assembly is then encased within insulating plastic. It is used as high frequency transmission line to carry high frequency or broadband signals. Noise is reduced to bare minimum in such type of cables. The cable that comes to our home from local cable TV network is an example of coaxial cable. It supports data transmission up to 10 Mbps. A coaxial cable is illustrated in figure 4.13(b).

### Optic Fiber Cable

Optic fiber consists of a very fine (as fine as hair) transparent fiber, usually made of glass or plastic. Light can pass through the fiber even if it is not straight.

Optic fiber cable consists of optic fiber enclosed within a rubber shield. Above it is placed braided copper or foil layer and the assembly is enclosed within jacket. An optic fiber cable is illustrated in figure 4.13(c).

In optic fiber cable data transmission takes place, using light. Light doesn't gather any type of noise from the atmosphere. Thus quality of the signal / message remains unchanged throughout the distance. Optic fiber cable support up to 100 Gbps data transfer rates.



**Figure 4.13**

### Non Wired Medium

The medium other than cable, which is used to transmit the message from one computer to another in a network, is called non-wired medium. Usually it is nothing other than air. Message from one computer, in the form of infrared waves or radio waves or high frequency waves passes through air and reaches other computer of the network. Thus a connection gets established among them.

This medium of communication is becoming popular day by day in computer networking. Wireless networking, including wireless Internet connectivity are very popular these days. LANs and WANs both are making use of this medium for computer connectivity.

### Message

What travels from sender to receiver is called message. As an essential rule of communication, message should reach the destination in its original form. No deformation or manipulation should take place in the middle.

## Protocols

A protocol is basically a set of standards that are decided between the sender and receiver for error free communication between them. A message, though received in its original form, is of no use, if receiver cannot understand the message.

For example, if the sender sends an encrypted message to the receiver and the receiver doesn't know that the message is in encrypted form, then in this case all the manipulations that are done at receiver's end, may lead to errors. Thus before communication starts, rules must be set that all the communication will be done in encrypted form and decryption has to be performed before the message is manipulated. It is quite obvious that if the rules of communication are set properly there will not be any problem in interpreting the message.

To understand the need and concept of protocol, consider a the smallest form of computer network, in which two computers say Com-1 and Com-2 are connected together, with the objective of communicating with each other. Say their addresses are 100.105.110.115 and 200.220.240.250 respectively. Say the computer Com-1 wants to send the message "MY ACCOUNT. NUMBER is 12376" to Com-2. For all practical purposes and security reasons they may decide the following rules for sending and receiving the messages.

### *Sending The Message*

1. Complete message will be broken into two equal parts.
2. Contents of the messages will be reversed.
3. Total number of digits in the message will be added at the end.
4. Address of the computer, sending the message, will be added at the beginning of the message.
5. Address of the computer, to which the message is being sent, will be added at the end of the message.

### *Receiving The Message*

1. Takeout the address from the end of the message and compare it with own address. If the addresses match, read the message else reject it.
2. Remove the addresses from the end and beginning of the message. Also remove total number of characters from the message to get the reversed message.
3. Count the number of characters in the message and compare it with the number received along with the message. If both the numbers match reverse the message to get the original message else ask the computer (whose address was attached at the beginning of the message) to sent the message again.

Following these rules Com-1 will break its message into two packets, as follows and send it to the other Com-2.

**Packet-1** : 100.105.110.115 UN TNUOCCA YM13 200.220.240.250.

**Packet-2** : 100.105.110.115 67321 SI REBM 13 200.220.240.250.

When Comp-2 will receive this message, it will perform all those steps, which have been agreed upon for receiving the message.

Note that this simple agreement between two computers (protocol) ensures following points:

1. Small messages are transmitted over the communications medium so that it doesn't get heavily loaded and other computers also get time to send their messages.
2. Message reaches the right destination.
3. If the message doesn't reach destination in original form, it is traceable and recovery is made by requesting the source computer to send the message again.

This example clearly illustrates that protocols are necessary in computer networks. They not only establish communication rules but they also promote efficient use of communication components. Numerous protocols are available for computer communication network. Some of them are described later in this chapter.

## MODES OF COMPUTING

Basic objective of any computer network is to share the resources. To meet this objective, computers are arranged in any one of the topologies mentioned earlier. Once they are connected, they can be configured to play different roles, within the network. The way they are configured would decide the approach that they would follow for communication and resource sharing. Following are few commonly used approaches that are used for resource sharing.

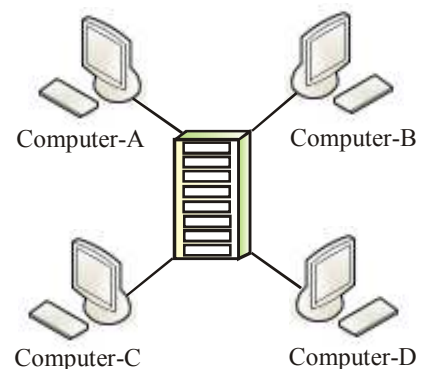
1. Peer to peer model
2. Client server model.

### Peer To Peer Model

In peer to per communication, any computer can access any computer's resources. For example, if there are four computers viz. A, B, C and D connected in a network then computer A can access computer B's hard disk and get the data from there. It can also access computer C's printer and print its files on it. Similarly computer B and C can access computer A's CD-ROM drives and get the required copies from there.

In this type of approach any computer can request for any resource from any computer and any computer can serve any computer of the network. Obviously a computer can access the resources of other computer, only if has been configured so and the access is allowed.

This is very simple approach for resource sharing. Theoretically it works for large number of computers (as large as 100) but practically suits well for 6 to 7 computers. Over and above this number, operational difficulties start occurring. Peer to peer communication is illustrated in figure 4.14.



**Figure 4.14**

## Client Server Model

In this type of approach, at least one computer is identified as Server. Server is generally a high-end computer, which is fast, has larger memory, fast disks and other peripherals that are to be shared among the users. This server holds all the resources (data, software, devices etc) that have to be shared among the users of the network (other computers).

Other computers of the network (that are not acting as server) act as clients (also called, node). Clients send their requests to the server for the resources. Server entertains their requests and supplies requested resources to clients.

Note that in this approach if S is the server then computer A, B and C do not interact with each other for resource sharing, instead, they interact with S, which has all the resources available with it.

This approach of resource sharing is quit popular now a days and is being widely used all over the world. A simple setup of client server architecture is illustrated in figure 4.15.

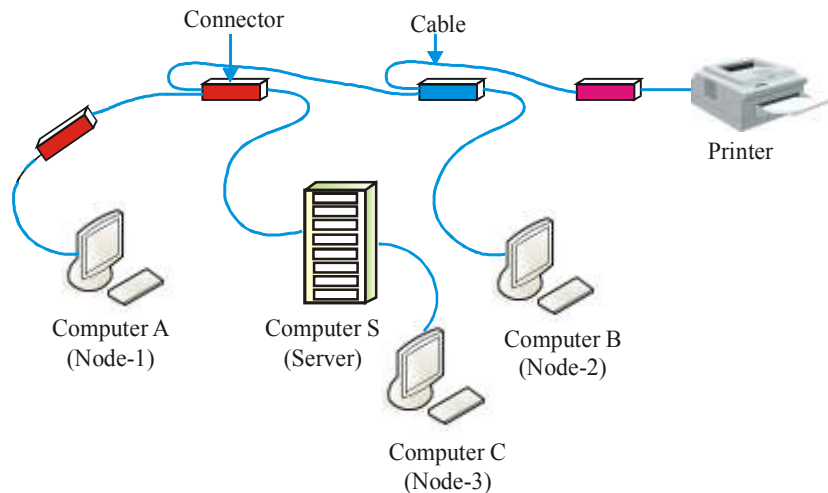


Figure 4.15

## COMMON NETWORK SERVICES

You know that computer network comprises of multiple computers, which communicate with each other to make resource sharing possible among them. For managing this task efficiently and carrying it out in error free manner, various network services are available. Each service has its purpose and advantage. Few commonly used network services are described below.

### Domain Name System (DNS)

Network resources are identified by four set of numbers that remain separated from each other by dots (.). Collectively these numbers are called IP address. For example, 128.105.200.010 is an IP address. This address could be assigned to a computer of the

network for identification. IP addresses are difficult for network users to remember. So network resources are also allocated a unique alphanumeric name called domain name. For example, computer having IP address 128.105.200.010 may also be allotted a domain name say grace.com, which is easy to remember. It is just like student of a college, who is identified by his roll number and name too. While working on computer network, most of the users refer computers by their domain name. Domain Name System is a network service that translates domain names into corresponding IP address. The server, on which this service operates, is called DNS server.

### **Simple Mail Transfer Protocol (SMTP)**

Simple Mail Transfer Protocol is a service that provides facility for sending and receiving e-mails over network. When a network user sends e-mail to other user, it first stops on the server that has SMTP service operational on it.

Since SMTP service is limited in its ability to queue messages at receiving end, it is usually used with one of the two other protocols, POP3 or IMAP that let the user save messages in a server mailbox and download them periodically from the server. In other words, it can be said that user of the network uses a program that makes use of SMTP service for sending e-mail and either POP3 or IMAP for receiving e-mail.

### **Telnet**

Telnet is a network service, using which other computers of the network can be accessed. For example, computer A, B, C and D may be networked together and you may be working on computer A. Using telnet you can access computer B. When you execute commands on computer A, they get executed on computer B. To start a telnet session on your computer, you should have a valid login name and password for the computer, which you wish to access.

### **FILE TRANSFER PROTOCOL (FTP)**

FTP is acronym for File Transfer Protocol. It is a service, using which files are transferred from one computer to another computer of the network

FTP comprises of two main computers i.e. FTP client and FTP server. FTP server monitors the network to find out if there is any request from a computer to establish a session. FTP client sends a request to server to establish a connection. Once the connection is established, client can perform following activities:

- (i) Uploading the file to the server
- (ii) Down loading the file from the server
- (iii)Renaming the file on the server
- (iv)Deleting the file on the server
- (v) Move the file from the server

## **Rlogin**

rlogin is a network service very similar to telnet. It is basically a UNIX command that allows an authorized user to login to another UNIX machine, present in the network. Once you login to other computer, you can perform all those activities, for which permissions have been granted to you.

## **Rsh**

rsh is other network service, which allows to run a single command on some other machine of the network. For example, computer A, B, C, D may form a network. In this network, using rsh service, a command may be given on computer A to copy a file from computer B to computer C. Note that while making use of rsh service, you do not login into remote computer but perform the task on it

## **X Window System**

X Window system is a major network service, which provides standard toolkit and protocols for building graphical user interface on UNIX, UNIX like operating systems and open VMS.

## **RPC Based Service**

RPC is acronym for Remote Procedure Call. It is a network service that allows a program on one computer to execute on another computer (server). The client program sends a message to the server with all required arguments and server returns a message containing the result of the program, which is executed. Using PRC service powerful distributed client/server programs can be developed.

## **Network File System (NFS)**

Network File System is a network service, which works for client server system. It lets a computer user view and optionally store and update files on remote computer, as if they were on user's own computer.

For example, if you were using a computer linked to second computer via NFS, you could access files on second computer, as if they resided in a directory on first computer. This is accomplished through the process of exporting and mounting. It was designed and developed by Sun Microsystems. To make use of it in network set up, server should have NFS server installed on it and client computer should have NFS client installed on it.

## **Web Service**

World Wide Web Consortium defines Web Service as software system designed to support interoperable machine-to-machine interaction over network. It makes use of Hyper Text Transfer Protocol (HTTP) to make multimedia applications come alive over network. Details of HTTP are described later in this chapter.

## **Finger**

Finger is a network service that tells you the name and other information related to given e-mail account. It also tells you if he is currently logged on to network or not.

To finger another network user, you need to have the finger program on your computer. The server at the other end must be setup to handle finger requests. A "Plan" file should be created for the user that can be fingered. Most of the colleges, universities and large corporations, who have their own computer network, install finger service in their network setup.

## **PING**

Ping is network service that sends series of data packets to a specific computer over network, in order to generate a response from that computer. The other computer responds with acknowledgement that it has received the packets.

Ping service was created to confirm if the given computer (with given IP address) exists and is connected to network.

## **SAMBA**

You know that network is a collection of interconnected computers. It is not necessary that all the computers should be of same type and should make use of same operating system. Truly speaking, network environment could be totally heterogeneous in terms of hardware and software both. But at the same time, it is preferred that while working on network all factors should be taken care by the network services, internally and user should be provided heterogeneous working environment, while shifting his work from one computer to another. For example, Windows user should be able to print his file on UNIX server, in the same way as he does on Windows system.

Samba is a network service that works between UNIX and Windows computer to provide same working environment to Windows users on UNIX server. Samba runs on UNIX platform, but speaks to Windows clients like a native. It allows a UNIX system to move into a Windows "Network Neighborhood" without causing a stir. Thus Windows user can comfortably access file and print services, without knowing or caring that those services are being offered by a UNIX host.

## **COORDINATING DATA COMMUNICATION (OSI MODEL)**

Computer network doesn't mean that all the computers will be of same type, they will use same operating system and communicate for same application. The truth is that a computer network may comprise of heterogeneous hardware, different operating systems and diversified applications. Such a situation demands that multi layered protocol should be defined to take care of the issues like, how the computers should be physically connected, how should data be transported from one computer to another, how two different applications should exchange data among them etc. To resolve this issue, International Organization for Standards (ISO) defined a seven layers model, called Open System Interconnection reference model or OSI model in short.



Each layer of OSI model is basically a specific issue. Related to each issue, it defines certain rules and thus sets parameter for network connectivity. OSI reference model is illustrated in figure 4.16.

Refer figure 4.16 and note that OSI reference model is a seven-layer mode. Each layer uses the functions of the layer below and exports the functionality to the layer, above. A brief introduction of each layer is given below.

### Physical Layer

First layer of OSI model is called physical layer. It defines all the electrical and physical specifications for the devices that are part of computer network. This includes pin specifications, voltage details, cable specifications etc. Specifications related to hubs, repeaters, network adapters etc are also specified in physical layer.

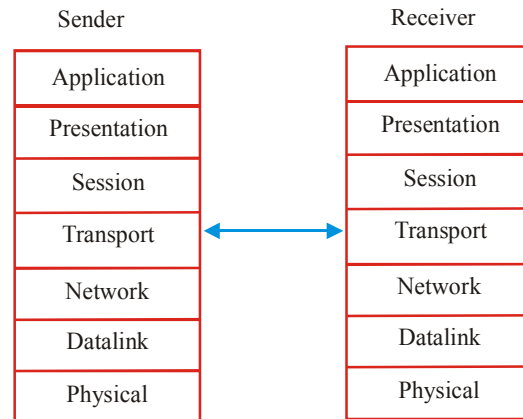


Figure 4.16

### Data Link Layer

Second layer of OSI reference model is called data link layer. This layer deals with the issues related to data transfers. It takes care of speed mismatches that may occur while data gets transmitted in the physical layer. It detects and possibly corrects errors that may occur in the physical layer.

### Network Layer

Third layer of OSI reference model is called network layer. It mainly deals with routing functions and congestion control.

To understand the concepts consider figure 4.17 that shows that there are various paths, which a message can follow, if it has to travel from A to D. It can either follow A->D or A->B->D or A->C->D path. Network layer decides, in which circumstance, which path should be followed. It takes care that no path should be heavily loaded.

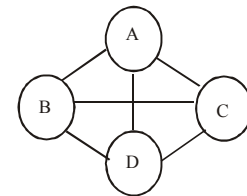


Figure 4.17

### Transport Layer

Fourth layer of OSI model is called transport layer. It mainly deal with flow control of data and provides error detection and correction mechanism.

To understand the concept, consider figure 4.17. D may receive data from A, B and C together for three applications, say Ap1, Ap2 and Ap3. Transport layer keeps track of each data stream and ensures that they maintain their individuality and do not get mixed up with each other.

### Session Layer

Fifth layer of OSI model is called session layer. It deals with the individual sessions that are established between the computers for communication. To understand the concept, refer

figure 4.17. Say A wants to be in dialog with D then it will open a session for communication and when communication finishes it will gracefully terminate the session. Session layer will perform these functions.

### **Presentation Layer**

Sixth layer of OSI reference model is called presentation layer. This layer mainly deals with the presentation aspects of the data. For example, the data may have to be presented in compressed form or coded form or EBCDIC data may have to be converted into ASCII or vice versa. All such type of data presentation activities are performed by presentation layer.

### **Applications Layer**

Seventh layer of OSI reference model is called applications layer. It mainly deals with making the information available to the user. For example, files residing on CUI based system (say a computer with Unix operating system) have to be viewed on GUI system, which is networked with it. It is quite obvious that these files have to appear as icons here on GUI based system. Now the question is, how this becomes possible? Well, application layer takes care of such issues. Telnet, FTP (File Transfer Protocol), Simple Mail Transfer Protocol (SMTP) etc. are few protocols that are related to applications layer.

## **DATA TRANSMISSION**

If we talk about ancient times, data was transmitted through pigeons or runners in the form of letters or instructions. In case of telephones, the voice is transmitted over telephone wires in the form of electronic signals. In case of TV transmission, programmers are transmitted through air in the form of very high frequency signals.

In case of computer network, data is transmitted through medium (that connects the computers of the network) in the form of signal.

In short, it can be said that in any kind of data transmission, now, data is transmitted in the form of signals (i.e. waves). Since signals could be of many types hence data transmission is also of many types. Different forms of data transmission are described below.

### **Forms Of Data Transmission**

Form of data transmission is directly governed by the type of signal that is used for transmitting the data. Data transmission has been classified into following two categories:

1. Analog transmission
2. Digital transmission

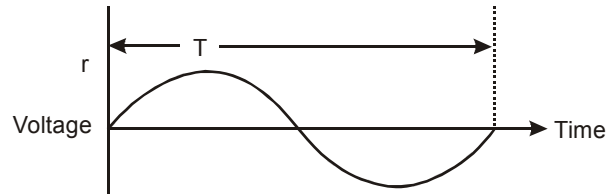
Details of both types of transmission are described below.

### **Analog Transmission**

To understand the concept of analog transmission, let's first understand the nature of analog signal.

An analog signal is a continuous signal, whose amplitude, phase, or some other property

varies with time. Voice signals, TV signals, electric signals, light signals etc. are the examples of analog signals. There are basically three characteristics, which define the analog signal/data. They are amplitude, frequency and phase. An analog signal in terms of continuously changing voltage is shown in figure 4.18.



**Figure 4.18**

### Amplitude

Amplitude of a signal at any given point of time is defined as the value of the signal at that time. Note that amplitude of the signal is varying with time in figure 4.18.

### Frequency

Frequency of the signal is measured as amount of time required by the signal to complete one cycle. Refer figure 4.18 and note that time period  $T$  shown in it defines its frequency.

### Phase

Phase is basically a relative concept. Thus, if you have two signals, phase difference between them at any point of time will be the cycle difference between them. Phase difference is measured in degrees. For example, if the phase difference between the two signals is 180 degrees that means, when one will have positive peak, other will attain negative peak.

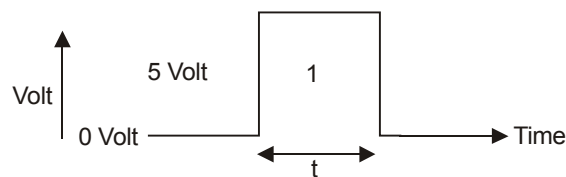
Data transmission, in which data is transmitted over the medium, in the form of analog signal, is called analog transmission.

For example, in telephone communication system, voice travels over telephone wires in the form of analog signals.

## Digital Transmission

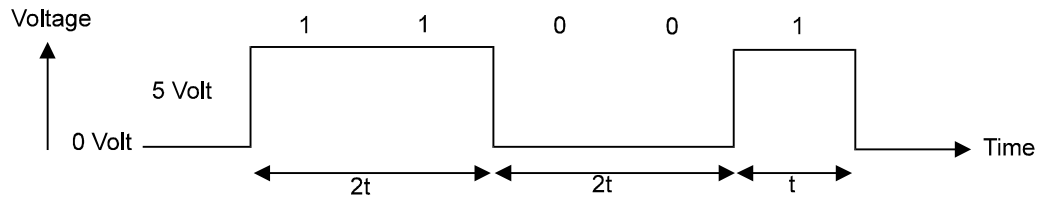
To understand the concept of digital transmission, let's first understand the nature of digital signal.

Digital signal is basically string of electronic pulses. It comprises of only two values, generally referred to as high and low. In computer, entire data is represented in the form of digital signals. High signal value denotes 1 and low value denotes 0. A digital signal is shown in figure 4.19



**Figure 4.19**

Using these pulses we can represent the number, 11001 as shown in figure 4.20.



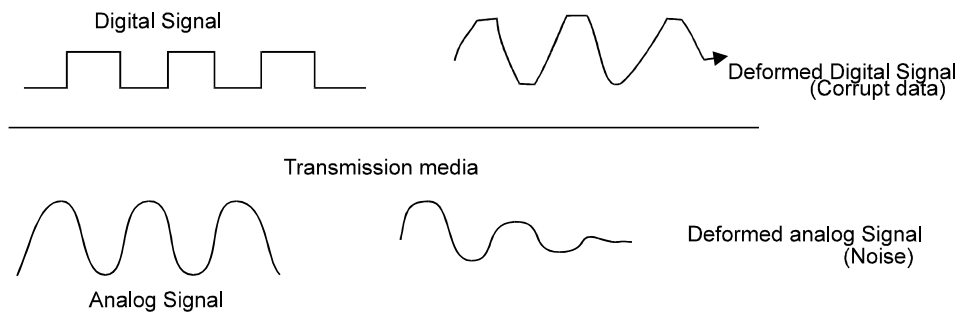
**Figure 4.20**

Data transmission, in which data is transmitted over the medium, in the form of digital signal, is called digital transmission.

For example, in a local area network, in which two computers are placed side by side, digital transmission takes place. Many modern TV channels transmit their TV programs in digital form.

## DAMPING

When signals are transmitted over transmission line, they start getting weak and their shape starts getting deformed as shown in figure 4.21.



**Figure 4.21**

This process of signals getting deformed is called damping. Note that a damped signal that reaches the destination will result into corrupt data (digital signal) /noise (analog signal).

At what distance the damping will start, will depend upon the power of the signal. Since digital signals are low powered signals hence they get damped much earlier than analog signals do. But it is a fact that both types of signals start dying after certain distance. So if a proper communication has to take place between the computers of the network then damping has to be stopped and the signal should reach the destination in its original form. There are many devices, which perform this task. Modem is one of them. Details of modem are described below.

## Modem

Modem is a device that enables computer to transmit data over telephone or cable lines.

Note that computer internally stores the data in digital form, whereas data over telephone lines is transmitted in the form of analog signals. A modem at sender's end converts digital form into analog form and the modem at receiver's end performs opposite function i.e. converts analog form into digital form. The functioning of modem is illustrated in figure 4.22.

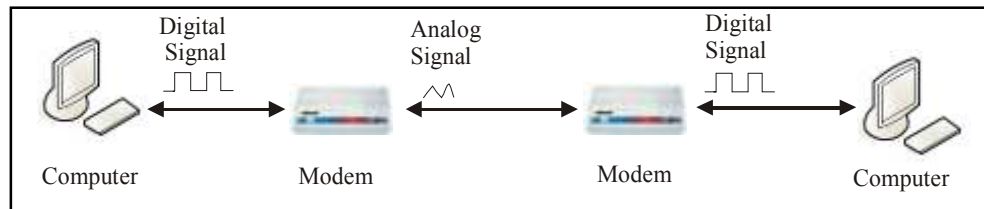


Figure 4.22

## DATA TRANSFORMATION

Data world within the computer comprises of digital signals. Computer receives, stores and generates data in digital form. In external world data exists in analog form. Thus for the interaction of two worlds, data need to be converted from one form to another i.e. from analog form to digital form and from digital form to analog form. These processes are done using following devices:

1. **Analog to digital converters:** As the name indicates, these devices convert analog signals into equivalent digital signals.
2. **Digital to analog converters:** These devices convert digital signals into equivalent analog signals.

### Analog To Digital Conversion

Analog to digital conversion is a process, in which analog signal is converted to digital signal.

As mentioned earlier and shown in figure 4.18, analog signals acquire continuous values over a period of time. For example, a sine wave signal of  $T$  frequency that varies from  $-5V$  to  $+5V$  will acquire all possible values such as  $-4.7, -4.5, -4.2, -3.6, 0, 1.6, 2.5, 3.8, 4.9$  etc. starting from  $-5$  to  $+5$  within  $1/T$  time interval.

As shown in figure 4.19, digital signals acquire only discrete values. For example, a digital signal of  $T$  frequency that varies from  $0$  to  $+5V$  may attain only two values i.e.  $+5$ , and  $0$  within  $1/T$  time interval.

Now the question is how, in the process of analog to digital conversion, so many values of analog signal are converted to discrete values, so as to have equivalent digital signal for given analog signal? Well, this is done in following steps:

1. First we decide all possible digital values that will be available for representing different values of analog signal.
2. Analog signal is sampled at regular intervals and its amplitude value is observed.

3. The value obtained at any time for analog signal is matched with the nearest digital value available and stored in digital form.

Details of these activities are explained below.

### **Deciding All Possible Values Of Digital System**

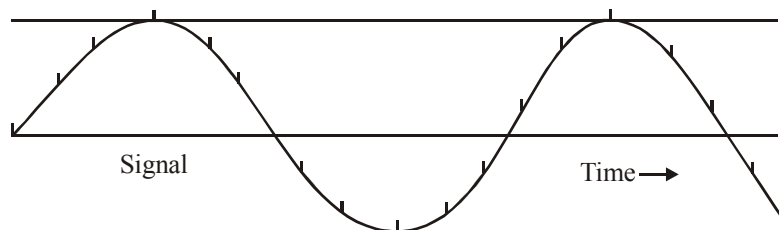
Number of possible values that would be used in digital system, depend upon the number of bits that would be used for representing the corresponding values of analog signal. For example, if you use 1 bit system then only 2 values i.e. 0 and 1 will be available for representation. If you use 2 bit system then  $2^2$  i.e. 4 values will be represented by it. These values will obviously be 00, 01, 10 and 11. On the other hand, 8 bit system will represent  $2^8$  i.e. 256 values and 16 bit system will represent  $2^{16}$  i.e. 25536 values. That means higher the number of bit, higher will be number of values represented by it. This is defined as accuracy. That means, higher bit system will be more accurate.

To understand the concept, let's take the case of 3 bit system. Say the analog signal varies from +5V to -5V. Thus all the variation starting from -5 to +5 i.e. -4.9, 3.8, 2.4, 1.2, 0, 1.9, 2.6, 3.8, 4.2 etc. will have to be represented using  $2^3$  i.e. 8 digital values only. That means this system will not be able to recognize any voltage variation, which is less than  $10/8$  i.e. 1.2V. In other words, you can say that in three bit system 1.3V, 1.5 Volt, 1.6 Volt, 1.7 Volt etc. will all be represented by same number say 101. This is not a very good condition. Such a system is not very accurate system.

Now let's take the case of 8 bit system. This system will have  $2^8$  i.e. 256 discrete values to represent all variations of analog signal. For example, if the analog signal varies from -5V to +5V then minimum variation of  $10/256$  i.e. 0.039V will be accounted for in this system. That means voltage like 1, 1.5, 1.6, 1.7 etc. will be represented by different digital numbers. This condition is far better than previous condition, in which 3 bits system was being used.

### **Sampling**

In sampling, amplitude of the analog signal is observed at regular time intervals. Sampling process is shown in figure 4.23



**Figure 4.23(a)**

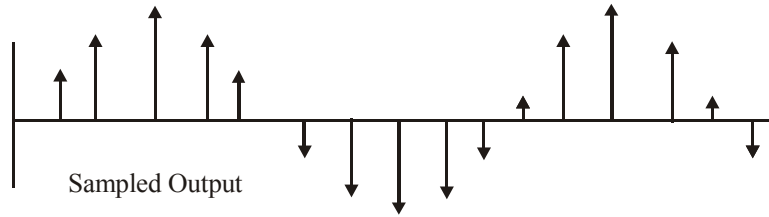


Figure 4.23(b)

From figure 4.23, it is clear that sampling period must be smaller than the time period of the analog signal.

## Quantization

Now the amplitude value observed for the analog signal at any point of time through sampling process has to be converted into equivalent digital number. But digital system deals with discrete values. It is very likely that the amplitude value that is to be converted falls somewhere between the two digital values. Thus the value nearest to it will have to be chosen.

In other words it can be said that quantization is the process of determining, which of the possible values is the closest value to the current sample. Quantization thus introduces error because digital value will be nearby value not the exact value. How big the error, or how accurate the answer will be, depends upon the number of bits that are used to denote digital equivalent. More the bits, better the answer.

In quantization, complete range is divided into two equal halves. (In the diagram this division is done using solid line). If the value, we are sampling, is above this line, '1' is assigned to it. On the other hand, if it is below, '0' is assigned to it. Consider figure 4.24 and take the case of A point. Since it lies in the upper half hence '1' is assigned to it in this process.

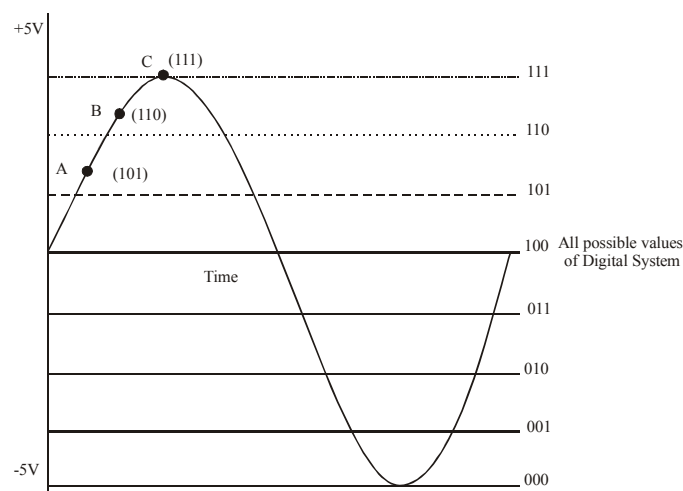


Figure 4.24

Now the half range that has the sampled value in it is again divided into two halves. In figure 4.24, this is shown by dotted line. Once again, if the value we are sampling is above this line, '1' is assigned to it. If it is below, '0' is assigned to it. Since point A lies below the dotted line hence 0 is added to the previous result. So after second round of division, we collect the result '10' for point A.

Now the half range that has the sampled value in it is again divided into two halves. (in figure 4.24, this is shown by dash line). Once again, if the value we are sampling is above this line, '1' is assigned to it. If it is below, '0' is assigned to it. Since point A lies above dash line hence '1' is added to the previous result. So after third round of division, we collect the result '101' for point A.

This process is repeated as many times as number of bits decided for the process (accuracy). For example, if we are working with 3 bit system then the process will be repeated 3 times. If we are working with 8 bit system, it is carried out 8 times.

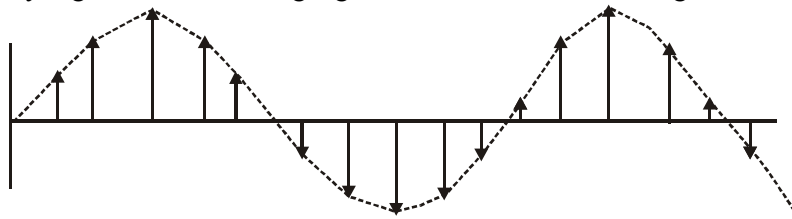
This process is done for each sample that we take in sampling process. For example, if we take three samples A, B and C then this process will be done for all the three values. Their digital representation will yield 101, 110, 111.

In actual, for better definition and better results, what we need is to take more samples (i.e. more points like A,B and C i.e. higher sampling rate) and more divisions (i.e. use of more number of bit to represent digital values i.e. higher accuracy).

Digital values obtained from sampling and quantization process are transmitted to the required destination. Thus analog signal gets transmitted to the required place in digital form. Since data is in digital form hence it does not get mixed with noise during the transit. It reaches there in pure form. At the receiving end, analog signal is reconstructed from the digital values received through dedicated devices.

### **Construction Of Continuous Signal From Digital Values**

D to A converters are used for obtaining analog signal back from digital values that are received. D to A converters construct the digital signal from the digital values. By extrapolation of the values they regenerate the analog signal. This is shown in the figure 4.25



**Figure 4.25**

## **TRANSMISSION TECHNIQUES**

Recall that in computers all the characters and number are represented in terms of 0s and 1s called bits. These bits are physically identified as low voltage (0 volt) and high voltage (5 volt) respectively.



While transferring the data from one computer to another, it is the stream of bits that get transferred. Say you want to transfer the number 589.

These three characters can be transferred under two conditions.

1. The time gap between transferring 5 and 8 is different than the time gap between transferring 8 and 9 (This happens due to various reasons). In this case when there is a time gap then voltage transmitted would be say one. So if it remains 1 for three cycles then the receiving computer will not understand that the line is idle or these three 1s are part of data.
2. The time interval between the transmission of two characters can be made constant.

### Asynchronous Transmission

Asynchronous transmission is a technique, which addresses to the first type of problem. In asynchronous transmission a start bit is added before every character and a stop bit is added at the end of every character. This is done by maintaining the transmission line in state of 1 and using 0 as the start bit. The stop bits are 1, to distinguish them from start bits.

Data bits are then transmitted at uniformly spaced time intervals between the start and stop bits. A timer at the receiving end starts with the characteristic pattern of asynchronous transmission. This is illustrated in figure 4.26.

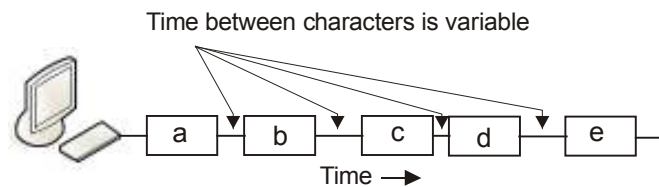


Figure 4.26

### Synchronous Transmission

In synchronous transmission the sending device has a clock and the receiving end also has a clock. Before sending the data both the clocks are synchronized and the time interval between the transmissions of two characters is maintained same.

Note that in synchronous transmission the speed of data transmission is increased because of the fact that the non-information carrying start and stop bits are removed in this method.

Once the two clocks are synchronized they continue to be synchronized because in between they send their own signals and keep synchronizing themselves. A characteristic pattern of synchronous transmission is illustrated in figure 4.27.

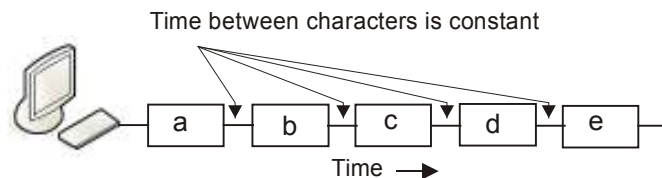


Figure 4.27

## MODES OF TRANSMISSION

Modes of transmission are concerned with the manner, in which the message travels along

the transmission line. Basically there are three modes of transmission for communication purpose. They are as follows:

- (a) Simplex
- (b) Half duplex
- (c) Full duplex.

### **Simplex Mode**

In this mode, the data is transmitted in one direction only. In no way, the sender can receive the information from the receiver and in no way the receiver can send the information to the sender that the message was received correctly. Radio and television broadcasting are the best examples of Simplex mode.

### **Half Duplex Mode**

In half duplex mode, data is transmitted in both the directions but not simultaneously. While the sender is transmitting, receiver cannot transmit his message. He will have to wait till the time sender stops sending his data. Wireless sets that are used in army are the best examples of it.

### **Full Duplex Mode**

In full duplex mode, line can send and receive data in both the directions simultaneously. Neither the sender nor the receiver has to wait for the other person to finish his transmission. Telephone lines are the best examples of full duplex mode.

## **PARALLEL TRANSMISSION**

In parallel transmission, there are multiple lines (usually 8 or multiples of eight) so that more than one bit can be transmitted at a time. Since multiple bits are transferred in parallel hence the transmission is very fast. But in spite of being fast, it is not practically used for longer distance because multiple lines are costlier to lay and due to the parallel wires running beside each other, the problem of cross talk starts and the signal gets corrupted. But for the shorter distances such as connecting printer to the computer for printing, it works very well.

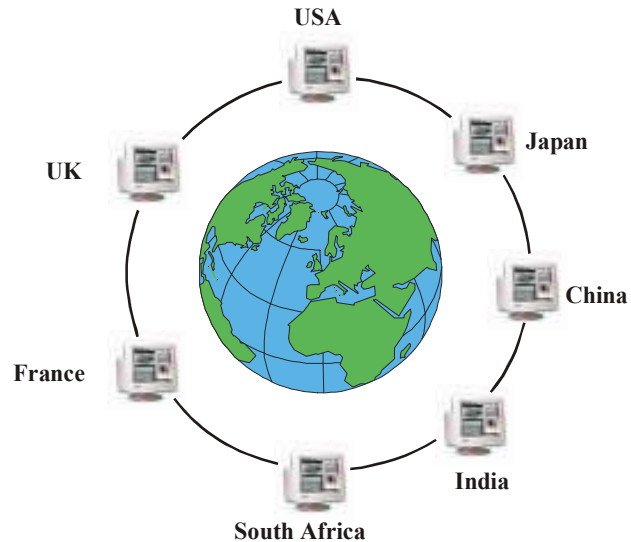
## **SERIAL TRANSMISSION**

In serial transmission there is only a single line (or few more) between the source and destination and the complete data is transferred through it. Since the data bits are transferred one by one, in series, hence serial transmission is quite slow in comparison to parallel transmission but in spite of its slow speed it is quite practical. This is the reason why it is used in abundance. For example, transmission between computer and terminal takes place in serial form. All USB devices such as pen drive, web camera etc are serial devices.

## INTERNET

When many computer networks of the world were connected together, with the objective of communicating with each other, Internet was formed. In other words you can say that Internet is network of computer networks, which spreads all across the globe.

Initially the size of Internet was small. It was limited to few geographical locations only. But soon, people become aware of its utility and advantages and within short span of time, numerous computers and networks got themselves connected to Internet. Its size increased multi fold within few years of its birth. Today Internet comprises of many million computers. There is hardly any country of the world and important city of the country, where Internet is not there. A conceptual diagram of Internet is illustrated in 4.28.



**Figure 4.28**

Internet is basically a large computer network, which extends all across the globe. In Internet, millions of computers remain connected together through well-laid communication system. Recall that telephone communication system is well-defined, time proven system. Internet makes use of this system any may other systems to connect its computers. Thus like a telephone connection, any computer of any city can establish a connection with any other computer of any other city and exchange data or messages with it.

## CLASSIFICATION OF INTERNET COMPUTERS

Computers of Internet can be broadly classified into two categories. These categories are:

1. Servers
2. Clients

Role and requirements of both types of computers are explained below.

### Servers

Those computers of Internet, which provide information or services to other computers, are called servers. For example, if a computer in an organization, named Hotmail provides electronic mail services to Internet users then that computer will be categorized as server.

Servers provide services / data to millions of Internet users, so they generally possess following characteristics:

1. They are fast.

2. They are equipped with large memory and large disk space.
3. They remain connected to Internet all throughout the day, seven days a week, 31 days a month and 365 days a year.
4. They make use of fast communication line.

## **Clients**

Those computers of Internet, which take information or services from servers, are called clients. For example, if you make use of Hotmail's server to send electronic mail to your friends or relatives then your computer will be termed as client.

Since clients interact, with servers, on one-to-one basis and that too when service/information is required hence they possess following characteristics:

1. They need not be very fast computers.
2. They need not have large memory and disk space as servers have.
3. They get connected to Internet, when they need the information/service. After taking it, they disconnect from Internet.
4. They generally make use of slow connection, like telephone lines, to get connected to Internet.

## **IDENTIFICATION OF COMPUTERS ON INTERNET**

Like houses of any city are identified by a unique address, similarly computers of Internet are identified by a unique address, called IP address. IP address comprises of four numbers separated by dots (.). For example, 150, 075,100.085 is a valid IP address. Each number in IP address can range from 0 to 255. So IP address can range from 0.0.0.0 to 255.255.255.255. Thus if IP address of a computer is known, it can be accessed over Internet.

## **HISTORY OF INTERNET**

In 1960 America suspected a nuclear attack from Russia. Thus America wanted to find a way to prevent its communication network from being destroyed in the war. So an agency of American Defense Department, called Advanced Research Project Agency (ARPA) funded a project, which connected the university computer scientists and engineers together via. their computers and telephone lines. The main objective of doing so was to facilitate exchange of information. Afterwards this project became popular with the name of ARPANET. Soon the users of ARPANET started sending e-mail to each other. With the help of e-mail it became possible to send messages from one computer to another computer (which may be located at any part of the world) within few seconds. The second fold advantage of this project resulted in the evolution of mailing list, with the help of which, it was possible to send the same message to different persons (located anywhere) at the same time. This project thus marked the development of Internet.

By the end of 1980, approximately 15,000 computers were connected to Internet. While in 1990, this figure went up to 3,00,000. But today the numbers of Internet connections are not easy to count.

Till 1992 all the services provided by Internet were text based. Thus in order to avail any of the facility, the user had to enter text commands. But soon in 1992 the invention of Graphical User Interface (GUI) made it possible to include graphics and other multimedia objects also with the text in the Internet. After a few years the Graphical User Interface became popular with the name of World Wide Web (WWW).

## **UNDERSTANDING WORLD WIDE WEB**

Internet and World Wide Web are often mistakenly used as synonyms, but the fact is that their existence is very closely associated with each other, but they are different. To understand the concept of world wide web, consider two objects, Say a piece of text "Keyboard is the main input unit of computer" and the figure of the keyboard. There exists a mechanism by which both these objects could be linked together, in such a way that whenever required, one can be accessed through other irrespective of their geographical location. For example, text and graphics could either be on same computer or on different computers (one in India and other in USA) connected over Internet/network.

This mechanism of linking does not restrict itself to text and graphics linking. Other objects like sound, animation, video etc. may participate in linking. Linking mechanism also doesn't put any restriction on the length of the chain. First can be linked to second objects. Second object could be linked to third object and so on. The growing chain can involve other computers of Internet/network.

Note that volumes and volumes of such linked objects exist over Internet. All such linked articles put together are called World Wide Web.

In other words World Wide Web can be defined as part of Internet that support specially formatted documents. Documents are formatted, using a special language, called Hyper Text Markup Language or HTML in short. Documents may consist of objects like text, graphics, audio, video, animation etc. that may or may not be linked to other objects of similar type.

## **WEB SEVER AND WEB CLIENTS**

Those servers of Internet, which host linked documents for making them available to other computers of Internet are called Web servers. Those computers, which access web servers to acquire information from web servers, are called web clients.

## **WEB SITE**

Web site is basically, well-identified location on web server, which holds the information of either an individual or an organization or place etc. Each web site of Internet is identified by a unique name, called domain name. For example, hotmail.com, yahoo.com, indianrail.gov.in, sanchar.net etc. are valid web sites.

Domain name comprises of two or more strings of characters separated by dots (.). First string of characters is called domain name. It identifies the name of the web site, For example, in indianrail.gov.in, indianrail identifies the name of the web site. Second string

of characters identifies the nature of the web site. For example in hotmail.com, com indicates that its is commercial web site. Standard strings that are used at second place in the domain name are as follows:

String	Type of web site
com	Commercial organizations (profit making)
edu	Educational institutes
gov	Government organization
mil	Military
net	Network service providers
org	Non profit making organizations

Third string in the domain name is always indicative of country. For example, "in" is used for India. "au" is used for Australia, "uk" is used for United Kingdom, "fr" is used for "France" etc.

If domain name of a web site is known, it can always be accessed and its contents can be viewed.

## WEB PAGE

Information or services on any web site are arranged in terms of web pages. A web page may contain elements like text graphics, sound, animation video and hyper links in it.

A web site may consist of interlinked multiple web pages. When you access a web site, its first page gets displayed on you computer. Since web pages of a web site remain interlinked through hyper links hence you can always access other web pages, after accessing the first web page.

## HYPER LINK

When a link between two objects, is maintained in such a way that when you click the mouse on first object, second object gets displayed then such a link is called hyper link. Concept of hyper link is illustrated in figure 4.29.

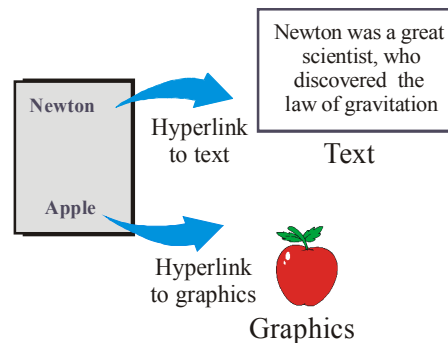


Figure 4.29

## HYPERTEXT

The text that remains linked to other objects like text, graphics, audio etc. through hyper link is called hypertext. For example, the words Newton and Apple in figure 4.29 are hypertext.

## HYPERMEDIA

As hypertext allows you to link the text with another text, in the similar manner, hypermedia allows the user to create a link from a particular document to either another program, or to another movie or sound clip or to Internet related facilities (like e-mail, chat etc.). When such types of links are created, they are known as Hypermedia.

## COMMUNICATION PROTOCOLS

You are familiar with the word protocol and are aware of its significance in relation to computer networks. To establish a proper communication network, many protocols are used. Few commonly used protocols are described below.

### TCP/IP

TCP/IP is basically an Internet Protocol suite, comprising of two basic protocols i.e. TCP and IP.

TCP is acronym of Transmission Control Protocol. This protocol is basically responsible for breaking the message into smaller packets before they are transmitted on the medium. At receiver's end, it reassembles the packets into corrects sequence to get back the message in complete and original form. The functioning of TCP protocol is illustrated in figure 4.30.

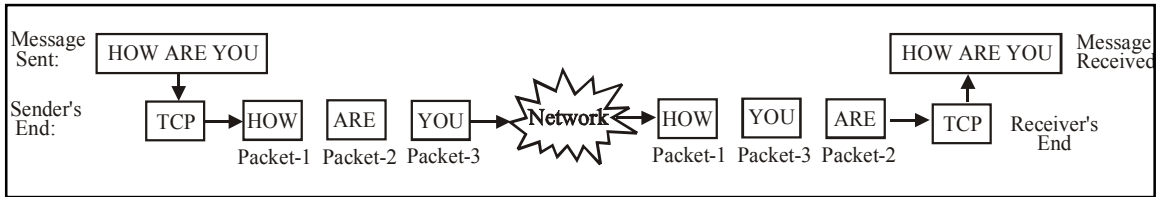


Figure 4.30

Note that transmitting shorter messages (instead of long messages) becomes easy in network. This makes the communications more efficient. Various packets can be routed through different routes (refer figure 4.17 as many routes remain available to reach the destination) at a particular time a particular line is not available.

Due to different routes undertaken, packets may not arrive the destination in sequence. Thus proper sequencing and assembling of the packet is done, as shown in figure 4.30. This activity is performed by TCP protocol.

IP is acronym of Internet Protocol. It mainly deals with addressing issues of the packets and few other aspects.

It adds addresses of the sender and receiver in all the packets. It also adds Time To Live (TTL) in each packet. As the packet travels over network this time decrements. Packet is discarded when it becomes zero. It prevents packets from wandering in the network forever and making congestion in network. The functioning of IP is illustrated in figure 4.31.

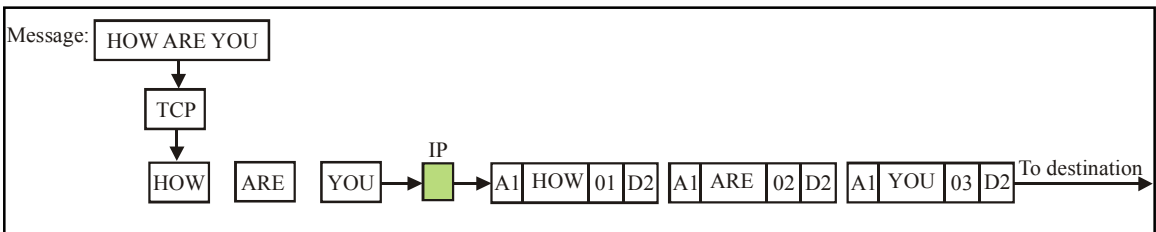


Figure 4.31

## IPX/SPX Protocol

IPX/SPX is short form of Inter network Packet Exchange/Sequential Packet Exchange. It is a network protocol, which was developed by Novell Corporation for its Novell Netware operating system but now it is being used freely for other environments also.

It is basically transport layer protocol. The SPX layer sits on top of IPX layer and provides connection-oriented service between two computers of the network. SPX is mainly used in client server applications. SPX/IPX protocol is similar to TCP/IP protocol. SPX performs all those functions, which TCP performs and IPX perform all these functions, which IP performs.

## Net BIOS/NetBEUI

NetBIOS Extended User Interface, is an unrouted network protocol. Routing is basically selecting a path from many paths that remain available for communication. Unrouting means, where no multiple choices of path are available. Since it is unrouted protocol hence it can only be used for communicating with the devices on same network segment.

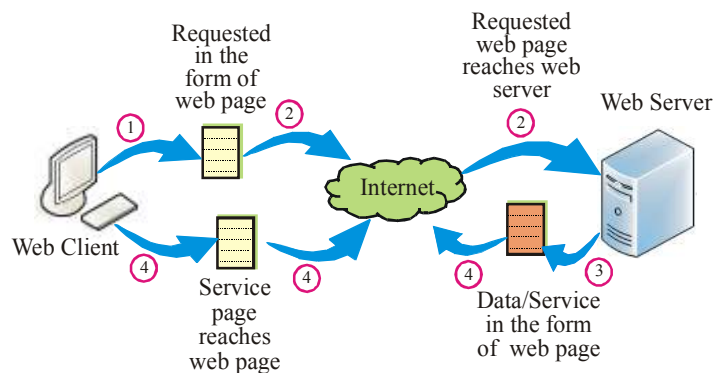
It is transport layer protocol. It was developed by Sytek company for IBM. It provides following three main service:

1. Name service for name registration and resolution.
2. Session service for connection oriented communication.
3. Datagram distribution service for connectionless communication.

## Hyper Text Transfer Protocol (HTTP)

Hyper Text Transfer Protocol is an Internet protocol, using which communication between web client and web server takes place. Dynamics of this protocol proceeds as follows:

1. When web client requires any information/service from web server, it makes a request to the web server in the form of a web page.
2. Request-web-page travels over Internet and reaches the web server.
3. Web server generates a web page containing requested information/service in it and sends it to web client.
4. Service web page travels over Internet and reaches the client.



**Figure 4.32**

Concept of HTTP is illustrated in figure 4.32.



## INTERNET USES

Internet results into instant data communication and on-line resource sharing. Due to these two factors, geographical boundaries have crushed, distance have lost their meanings, communication barriers have broken and such applications and services, which were not at all possible few years back, have now come into existence.

Today Internet is not only being used for business purposes, but for personal use also. It has brought a revolution in the society. Due to its easy availability and affordability, working and thinking patterns of human being are continuously changing and new methodologies are evolving. Below given are few important uses of Internet.

### Centralization Of Information

Internet is commonly used for storing the data / information, centrally and making it available for others. Centralization of information doesn't sound so great but applications developed around this concept are really great.

1. **Reservation System:** It is a useful application that serves masses. Reservation in airplanes, trains, hotels, cinema halls etc. can be done sitting at home, using Internet. This is possible because information related to the item to be reserved remains centrally available on servers and clients can access it through Internet.
2. **Enquiry System:** Service organizations make all important information, notices and forms centrally available on server. Clients access these servers using Internet and obtain required information. For example, financial institutions may store rates of shares, bonus announcements, coming issues etc. on the server and clients may obtain required information from there.
3. **Corporate Business System:** These days companies, organizations, institutions etc. have their own computer networks connected to Internet. Company's information is maintained at a central place say, head office. Their regional offices, business clients, vendors etc. access them for their uses through Internet. For example, an organization may allow its suppliers to access company's purchase requirements and submit on-line quotations.
4. **Education Service System:** Making admission forms, examination notices, results of examination etc, available to the masses are the common applications, which educational institutions make possible through Internet. For this, they make the information centrally available on some server of Internet. Virtual universities have now come into existence, in which services related to registration, teaching, problem handling, examination etc. are provided to the students over Internet.

### Fast Communication

Instant data transfer over Internet leads to fast communication among network users. It also ensures data delivery. Transfer losses are never there. Following are few commonly used communication applications, which are quite popular in Internet environment:

1. **Video Conferencing :** Video conferencing is an application, in which not only

- voice communication takes place among network users but they also exchange their live movements through web camera.
- 2. Voice Chat** : There are many network applications, using which network users talk to each other on Internet, like they do on normal phone. For this, they make use of microphone (speaking) and speakers (listening) connected to their computer.
- 3. Text Chat** : Using text chat application, network users exchange their thoughts and feelings by typing the text on their computers. What one user types on his computer, appears on other user's computer and what other user types on his computer appears on first person's computer.
- 4. e-mail** : e-mail is the most commonly used network application. Using this application users exchange letters over Internet. Letters sent through e-mail reach their destination instantly and do not get lost in the transit.

### **Efficient Services**

Organizations and institutions make use of computer networks for providing efficient services to either internal people or external persons. Following are few services, which are common over Internet:

1. On-line advice.
2. On-line help.
3. On-line enquiry.
4. FAQ (i.e. answer to frequently asked questions made available in the form of list).

### **FUTURE OF INTERNET**

What Internet used to be few years back is not today. What it is today will not be in future. Its shape, resources and services are advancing at amazing speed. Many surveys and studies have been conducted all across the world to predict the future of Internet.

A consortium led by 206 universities working in partnership with industry and government has been formed (in 1996) to develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet. It has been named Internet2.

Based on these surveys and present developments, it is expected that following things will hold true for Internet future:

1. Internet will be more deeply integrated in our physical environments and high-speed connections will proliferate.
2. Today PC dominates Internet. Majority of the computers connected to Internet are Personal Computers. It is expected that more devices like Personal Digital Assistant (PDA) will come into existence and will be part of Internet.

3. Soon, everything from your car to your refrigerator will be connected to the global network, communicating with each other wirelessly. Electrolux, best known for its vacuum cleaners, has developed the ScreenFridge, an Internet icebox that manages your pantry, among other things. It e-mails a shopping list to your local supermarket and coordinates a convenient delivery time with your schedule.
4. It is expected that there will be a great change in the field of arts and entertainment. The ability to receive real-time music and video over the Internet, or downloaded content, will radically transform business models for TV and movies as it is already doing for music. It will also continue to change the relation of the public to artists as it has through fan sites, remixes, and other Internet-based phenomena.
5. As computing devices become embedded in everything from clothes to appliance, from cars to phones etc. these networked devices will allow greater surveillance by governments and businesses.
6. Enabled by information technologies, the pace of learning in the next decade will increasingly be set by student choices. In ten years, most students will spend at least part of their “school days” in virtual classes, grouped online with others who share their interests, mastery, and skills.

## POPULAR USE OF WEB

World Wide Web is an ocean of information and service. Using web browser, you can make use of web in numerous ways. Few popular used of web are described below.

### Web Browsing

Moving from one web site to another web site is called web surfing or web browsing. To access the web site, follow the following steps:

1. Get connected to Internet
2. Invoke Internet Explorer and get Internet Explorer window on the screen.
3. Enter domain name in address bar and press "Enter" key.

When you do so, Internet Explorer will search the web site and if it gets it, it will display its first page, called opening page in the browser window. For example, if you access yahoo.com web site, its opening page, as illustrated in figure 4.33, will get displayed in Internet Explorer window.



Figure 4.33

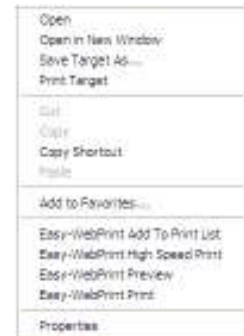
### Following the Links

Refer figure 4.33 and note that web page contains few icons, a text box with button and many text-items in it. Truly speaking, each icon and each text message is a link. When you click the mouse on any of the links, linked item or service will get displayed in Internet Explorer window. For example, there is a Mail icon in the web page. When you click the mouse on it, a web page, offering e-mail service appears in Internet Explorer window. Similarly you can click the mouse on other links to avail associated services.

While traversing through links, if you wish to go to a specific web site, enter the desired domain name in address bar and press "Enter" key. If you do so, current service will get terminated and you will be taken to the opening web page of the mentioned web site. For example, if, while working with yahoo's e-mail service, you enter "hotmail.com" in the address bar and press "Enter" key, e-mail service will get terminated and opening web page of hotmail.com will get displayed in Internet Explorer window.

If you wish to retain the current page in current window and open the linked page in new window then instead of clicking the mouse on the link, right click the mouse on it. When you do so, a popup menu, as illustrated in figure 4.34, will appear on the screen.

Now select "Open in New Window" option from this menu. When you do so, linked web page will get opened in new window.



**Figure 4.34**

## SEARCHING CONTENTS ON INTERNET

Internet is an ocean of information. Be it any topic, science, culture, entertainment, tourism, medical or aviation, volumes and volumes of information can be found on Internet. This information remains available on web sites and can be availed by visiting the web site.

Now the question is, there are millions of web sites on Internet, so how do you come to know, which information is available on which web site and what is its domain name? Well, Internet itself provides the solution for this problem. There are certain web sites, which provide search facility for searching the contents on Internet. For example, yahoo.com is a web site, which provides search facility. Refer figure 4.33 and note that search facility remains available in the form of a text box and a button titled "Search" To get the information on any desired topic, follow the following steps:

1. Enter the search term in text box. For example, if you wish to get the information on "Examination Taking Techniques", enter this term (called, search term) in the text box and click the mouse on "Search" button.
2. When you do so, a program called Search Engine will search its information database and find the links to the information. Found links will get displayed in the form of a list, as illustrated in figure 4.35. In technical terms, this list is called "Hit List".

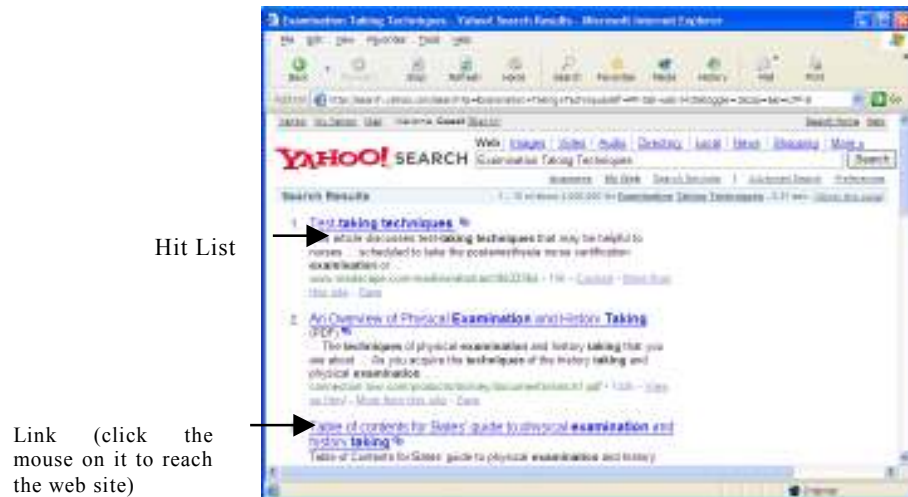


Figure 4.35

3. To reach the web site that contains the information, click the mouse on any desired link of the hit list.
4. After reaching the web site, you can make use of browser's "Back" button, to get back to the hit list.
5. Now click the mouse on another link to get more information on the same topic, but from another web site.

### Important Points Related to Internet Search

Following are some of the important points that should be kept in mind, while searching the information on Internet.

1. Different search engines provide different hit lists. Thus if the results of one search engine are not satisfactory, different search engines should be tried for better results. For example, after searching the information on yahoo.com, you can move to google.com. This web site provides a different search engine. Same search term here may provide different results.
2. Search term plays an important role in the process of acquiring the information from the Internet. So search term should be framed carefully. For example, you may wish to get information on life style of Gandhi ji. For this, if you use the search term Gandhi, you may get lot of irrelevant information, which may not be of any use to you. For example, links related to Gandhi park, Gandhi restaurant, Gandhi club etc. may appear in the hit list. Thus if you use the search term, "Gandhi life style", it is likely that you may get the desired information.

Other search terms, relate to same topic should also be tried, while searching the information. For example, search term "Gandhian Philosophy" may also, fetch the desired information.

3. Two search terms can always be added, using logical operators like AND and OR to make the scope of the search more specific. For example, the search term "Flights to UK AND Flight to Franch" will yield wider results.
4. Some of the search engines produce specie results when the search term is enclosed within double quotes. For example, to search information on atom bomb you have to define the term as "atom bomb" else they will give two different types of information i.e. one on atom and another on bomb.
5. Some of the search engines, like yahoo.com provide advanced tools for defining the information that is required. If the search term is such that it does not define the information precisely then advanced tool should be used for narrowing down the scope.
6. All major web sites also provide category list. This list is usually arranged topic wise. For example, go to yahoo.com. Down, in its first page, you may have the category list, as illustrated in figure 4.36.



**Figure 4.36**

Refer above illustrated figure and note that Art & Humanities, News Media, Business & Economy, Recreation and Sports, Computer & Internet etc. are various categories that are present in the web page.

When you click on any category, your browser will display a list of subcategories. Now click a sub category heading of your choice. When you do so, you are again presented with a list of sub sub categories. You have to continue in this fashion, drilling down the complete tree, until you reach the desired page, related to the selected topic.

## Chatting

Chat means talking. Chat service provides the means of on-line communication with other Internet users. Using this service, two or more Internet users talk to each other, by typing their messages on their terminal. What one-user types on his terminal, gets displayed on other user's terminal immediately. If he wishes to react against this message, he has to type his reaction on his terminal. Now, whatever he types on his terminal gets displayed on other person's terminal. Thus talking through typing can continue, till the time both the persons want.

This is the most popular and widely used service of Internet. To make it more interesting and realistic, chat service is generally provided in the form of logical rooms.

All rooms are generally related to a topic. For example, relationship, computers, friendship etc. It is possible that there may exist many rooms with in a specified topic. For example within computers there could be many rooms such as Hardware, Graphics, Multimedia, Virtual Reality, Internet etc. The basic objective of having topic-related rooms is to form a collection of people with similar interest, so that the chat may result into fruitful discussion and the number of chatters remain limited in a room. On the other hand, if the number of room were not categorized into focused variety of topics then, there would be a huge crowd of chatters in the same room. In such a room there would always be a crowd of chatters who have diversified interest. In such a situation, chatters may not find them comfortable and may start leaving the room.

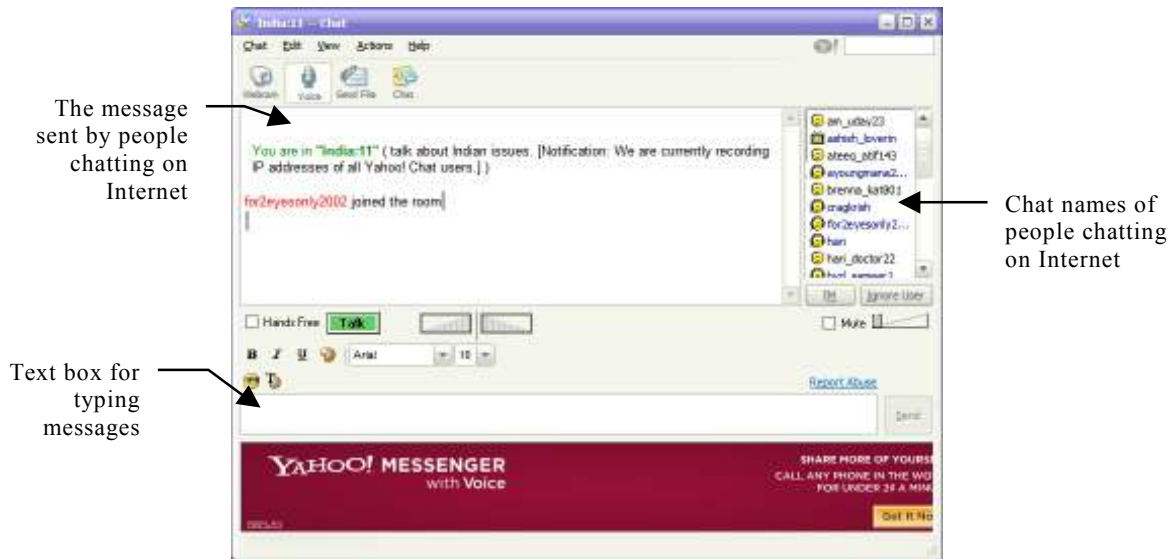
Chat is very common service of Internet. It remains available on most of the web sites. For example yahoo.com, excite.com, icq.com, hotmail.com etc. are the names of few web sites which provide chat service to their visitors.

To make use of chat service, you have to first go to the web site of your choice, where you would like to chat. Now you have to open your chat account, if you have not yet opened it. When you open your chat account you have to declare your profile (name, age, country e-mail address) and choose your chat name. Chat name is the name that you would like to use during the chat. The chat name could be different from your real name because you may not like to disclose your real name to chatters because of security and personal reasons. Generally people use those type of chat names which qualify their properties or need. For example softman, helpingman, jollyboy. are the names which give an indication of the nature of the person. Similarly wanting-jokes, wanting-help, give-me-info are the names which clearly state the need of the person.

After creating your profile, you can choose any chat room of your choice. When you enter the room, you would find many persons present there. Chat names of all the persons present in the room would be displayed on the screen.

Now you can type your message or feelings on your terminal. Whatever you type on your terminal, would get displayed on the terminals of each person who is present in the room. If someone wishes to talk to you, he can type his message for you on his terminal. That message will get displayed on everybody's terminal, including your. Thus you can keep on communicating till you or the other person wants.

A chat session can be invoked through yahoo messenger. When you invoke chat session, a chat room as illustrated in figure 4.37 gets displayed.



**Figure 4.37**

Refer above illustrated figure and note that all-important components of chat web page have been labeled, to give you an idea of chat dynamics and its operations. Using this web page you can read the message sent by other people and you can also send your own messages.

Chat also provides you the facility of sending personal messages to the desired persons. In such a case your message gets displayed only on other persons terminal, not on everybody's terminal. Thus you can do some private talks. For this, you have to simply double click on person's chat-name. When you do so then a message box appears on the screen. Whatever you type in this message box gets transmitted as private message to other chatter. A similar type of message box appears on other person's terminal also. The message sent by you (to him) gets displayed in his message box. What ever he types in his message box, gets displayed in your message box. Thus chat continues in private mode and nobody comes to know what you are talking to other person.

Some of the chat services provide you the facility to create your own private room. You can invite other chatters, in your room to talk privately. This saves you from other people's unwanted messages to appear on your screen. Thus you can have dedicated chat in isolated environment.

## **Internet Telephony**

As the name suggests, Internet telephony is a service, using which Internet users can have voice-talk with others. It is quite obvious that to make use of Internet telephony service,



your computer should have multimedia kit attached to it. Internet telephony service can be mainly categorized into two main categories. One is Net-to-Net type of telephony. Other is Net to Phone telephony. In Net to Net type of telephony, both the persons i.e. caller and receiver have to be on-line with Internet.

When both the persons are on-line, then one of them dials other persons telephone number. Other person receives the ring and if he accepts the call then voice connection is established between them and they start talking. In Net to Phone telephony, only one person has to be on-line with Internet. This person rings other person's telephone number from his computer. Other person receives a ring on his telephone set (not computer as is done in Net to Net telephony). If this person picks up his hand set then a connection gets established between the two parties. Now, whatever, first person speaks in front of his microphone, gets transmitted to other person's hand set. Whatever other person speaks in his handset, gets transmitted to first person's speaker.

yahoo messenger, skype etc. are the services, which provide services for both types of telephony. Generally net to net telephony is free while net to phone telephony is paid service.

## **Internet Shopping**

Internet shopping is a facility, using which items of choice can be purchased over Internet.

There are numerous website, such as yahoo.com, dell.com amazon.com, excite.com etc. which display all those items, which are for sale on the web site. In e-commerce terms these web sites or web pages are called e-shops or e-malls. In e-malls along with the picture of the product, their description, price and highlights also get displayed.

Items of interest are selected by clicking the mouse on the product image. A program called shopping basket or shopping cart remains vigilant in the background. It keeps track of all the items, selected for purchase, cost of purchase, applicable taxes and discount etc. Whenever required, it displays the status of the basket / cart. It also provides facility to add or remove items to / from it.

When all the items for purchase have been selected, Purchase Now / Submit button present on website is activated.

On activating Purchase Now / Submit button, buyer is offered an on-line form, for submitting his personal details. Using this form, he generally provides to the seller, his name, address, phone number, e-mail address, shopping address etc. so that purchased items could be sent to the purchaser on his address.

e-shopping sites also provides the facility of on-line payments. On-line payments are made through credit cards. A secured page for accepting buyer's credit card number, amount of payment etc. gets displayed where he provides all relevant information. As soon as this information is provided, given information is verified from all relevant sources. In the event of information being correct, money is transferred from user's bank account to seller's bank account and the seller sends all purchased items through post /or courier to the purchaser on his address.

Some of the items, such as games softwares memberships, access rights etc. are downloaded to purchaser's computer immediately, when he makes payment for these.

An e-shopping web site is illustrated in figure 4.38.

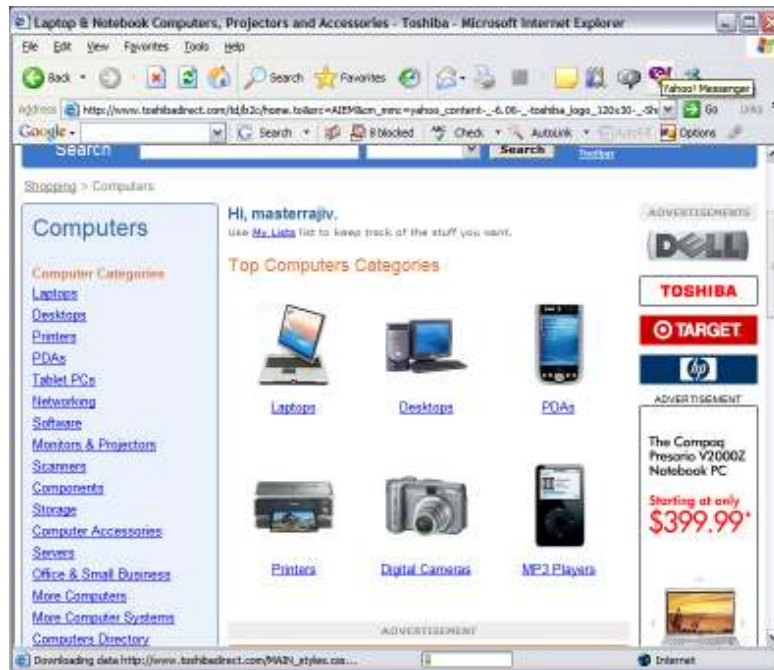


Figure 4.38

## OTHER SERVICES OF WEB

Apart from above-mentioned services following services are also available on World Wide Web:

1. There are many web sites, which provide the facility to select a greetings card from many of those available on web site and send it to relative or friend.
2. Many on-line magazines and newspapers are present on web. By accessing related web site you can read them on-line.
3. News-group is a service, using which people share their views, solve their problems and help other Internet users.
3. There are many web sites, which provide astrology related services over web.
4. Movies can be viewed on web.
5. Songs and radio can be enjoyed on web.
6. Railway or air tickets can be purchased on-line over web.
7. Hotel bookings can be made on web.

8. Weather forecasts can be had from related websites.
9. On-line classes can be attended and examination can be taken on web by taking admission in virtual universities.
10. Jokes, SMS, Pager etc. can be sent to friends and relatives over Internet.
11. Games can either be downloaded or played over Internet.

## SUMMARY

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*When two or more computers are connected together with the objective of communicating with each other and sharing their resources, they form a computer network.*

*Computer network is the most modern medium of communication. Using computer network, fast and reliable communication takes place. Following are the reasons for networking:*

1. *To share distant devices.*
2. *To share software of other installations.*
3. *To provide a communication medium.*
4. *To evenly distribute the load of processing.*

*Following are few useful applications of network:*

1. *Rail/Air reservation system.*
2. *Internet banking & ATMs.*
3. *E-Mail.*
4. *Information sharing applications.*
5. *On-Line education and examinations.*
6. *Network games.*

*Following are the benefits of networking:*

1. *Information, available at distant locations can be accessed within no time.*
2. *Costly devices can be shared among many users.*
3. *Work can proceed even if one or few computers are down.*
4. *Much better applications can be made, which provide great help and services to its users.*
5. *Better and efficient communication takes place between the users.*
6. *On-line services can be provided, which save time and efforts.*

## **TYPES OF NETWORKS**

*Computer networks are broadly classified into two categories:*

**Local Area Networks (LAN):** Local area networks are the networks that spread within a short distance of a kilometer or so and are generally confined to a building or a campus.

**Wide Area Networks (WAN):** Wide Area Networks or WAN are the networks, in which computers are spread over long distances (more than a kilometer). Computer of Wide Area Network can either be in different countries, cities or localities.

Campus Area Network (CAN), Metropolitan Area Networks(MAN) and Home Area Network (HAN) are few variations of LAN and WAN.

Topology is basically the physical arrangement of computers in the network. Following are commonly used network topologies:

**Bus Topology:** In bus topology, all the computers and devices of the network are connected to common medium (cable).

**Ring Topology:** In ring topology, computers of the network are connected to each other in circular fashion.

**Star Topology:** In star topology, computers of the network are connected together through a special device called hub. Each computer is connected to the hub. Thus the link of one computer is established with other computers via hub.

**Mesh Topology:** In mesh topology each computer of the network remains connected with other computers through dedicated medium.

Basic model of network communication comprises of following essential components:

**Sender:** The computer, which sends the message is called sender.

**Receiver:** That computer of network, which receives the message is called receiver.

**Medium:** Medium is basically that substance through which message propagates and reaches the destination. Medium can be wired medium or non-wired medium. Wired medium could either be twisted pair cable or coaxial cable or optic fiber cable while air works as non-wired medium.

**Message:** What travels from sender to receiver is called message.

**Protocol:** A protocol is basically a set of standards that are decided between the sender and receiver for error free communication between them.

Following are few commonly used network services:

**Domain Name System (DNS):** It translates domain names into IP addresses.

**Simple Mail Transfer Protocol (SMTP):** It provides facility for sending and receiving e-mails over Internet.

**Telnet:** It provides facility to login into another computer of the network.

**File Transfer Protocol (FTP):** It provides facility for transferring files from one computer to another over network.

**Rlogin:** It provides facility to login into a computer that is at remote location.

**Rsh:** It provides facility to execute a single command on some other computer of the network.

**X Window System:** It provides standard toolkit and protocols for building graphical user interface on UNIX and UNIX like operating systems.

**RPC Based Service:** It is a network service that allows a program on one computer to execute on another computer.

**Network File System (NFS):** It lets a computer user view and optionally store and update files on remote computer, as if they were on user's own computer.

**Web Service:** It makes use of Hyper Text Transfer Protocol (HTTP) to make multimedia applications come alive over network.

**Finger:** It tells you the name and other information related to given e-mail account. It also tells you, if he is currently logged on to network or not.

**PING:** It sends series of data packets to a specific computer over network, in order to generate a response from that computer.

**SAMBA:** It is a network service that works between UNIX and Windows computer to provide same working environment to Windows users on UNIX server.

Organization for Standards (ISO) has defined a seven layers model, called Open System Interconnection reference model (OSI model) for establishing proper communication between the computers of the network. These layers are:

**Physical Layer:** It defines all the electrical and physical specifications for the devices that are part of computer network.

**Data Link Layer:** It takes care of speed mismatches that may occur while data gets transmitted in the physical layer. It detects and possibly corrects errors that may occur in the physical layer.

**Network Layer:** It mainly deals with routing functions and congestion control.

**Transport Layer:** It mainly deals with flow control of data and provides error detection and correction mechanism.

**Session Layer:** It deals with the individual sessions that are established between the computers for communication.

**Presentation Layer:** This layer mainly deals with the presentation aspects of the data.

**Applications Layer:** It mainly deals with the mechanism of making the information available to the user.

Data transmission is conveyance of any kind of information from one place to other. Data transmission is basically of two types i.e. Analog transmission and Digital transmission. Data transmission, in which data is transmitted over the medium, in the form of analog signals, is called analog transmission.

Data transmission, in which data is transmitted over the medium, in the form of digital signals, is called digital transmission.

Two transmission techniques are there. They are asynchronous transmission technique and synchronous transmission technique.

*In asynchronous transmission a start bit is added before every character and a stop bit is added at the end of every character that is transmitted. Data bits are then transmitted at uniformly spaced time intervals between the start and stop bits.*

*In synchronous transmission the time interval between the transmissions of two characters is maintained same.*

*The manner, in which the message travels along the transmission line is called mode of transmission. Following are the three modes of transmission:*

**Simplex mode:** *In this mode, data is transmitted in one direction only.*

**Half duplex mode:** *In half duplex mode, data is transmitted in both the directions but not simultaneously.*

**Full duplex mode:** *In full duplex mode, transmission line can send and receive data in both the directions simultaneously.*

*Network of computer networks is called Internet. It extends all across the globe. Computers of Internet are broadly classified into two categories:*

**Servers:** *Those computers of Internet, which provide data and services to other computers of Internet are classified as servers. They are generally fast computers and remain connected to the Internet for all the 24 hours of the day.*

**Clients:** *Those computers of Internet, which take data and services from other computers of Internet, are classified as clients. They are generally slow computers in comparison to servers and get connected to Internet as and when they require services from the servers.*

*Computers of Internet are identified by a unique address, called IP address. IP address comprises of four numbers separated by dots (.). For example 024.136,225,128 is a valid IP address. They are also identified by a unique name, called domain name.*

*That part of Internet, which makes use of Hyper Text Transfer Protocol so as to make use of multimedia media objects possible, over Internet, is called World Wide Web.*

*E-mail, video conferencing, chatting, Internet telephony, on-line shopping, banking, searching information on Internet, Virtual university etc. are few popular uses of Internet.*

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## EXERCISES

## CHAPTER 4

### Short Type Questions

#### A. Select best possible options for following questions:

1. Which of the following is not an essential element of communication system?  
(a) Sender (b) Receiver  
(c) Wire (d) Message

2. What is protocol?
  - (a) A message
  - (b) Rules that have been set.
  - (c) A code
  - (d) A network device
3. Which of the following network remains confined to a building?
  - (a) LAN
  - (b) WAN
  - (c) MAN
  - (d) None of the above
4. In which type of network, computers of five different cities are connected together to form a computer network?
  - (a) LAN
  - (b) WAN
  - (c) HAN
  - (d) SAN
5. Which of the following topology makes use of a special device called hub?
  - (a) Bus
  - (b) Star
  - (c) Ring
  - (d) Mesh
6. What is TCP/IP?
  - (a) A compression techniques
  - (b) A protocol
  - (c) A type of network
  - (d) A topology
7. How many layers of protocol are there in OSI model of network?
  - (a) 7
  - (b) 6
  - (c) 5
  - (d) 10
8. Which layer of OSI model is related to physical connection of computers, within the network?
  - (a) First
  - (b) Second
  - (c) Fifth
  - (d) Seventh
9. Which of the following is related to file transfers across the network?
  - (a) FTP
  - (b) TCP/IP
  - (c) CSMA/CD
  - (d) Telnet
10. Which of the following will have fastest rate of data transmission in it?
  - (a) Twisted pair of wire
  - (b) Coaxial cable
  - (c) Optic fiber
  - (d) Starlight wires
11. Which of the following device is used to connect computer to the telephone line?
  - (a) modem
  - (b) A to D converter
  - (c) Optic fiber cable
  - (d) Web server
12. In which of the following technique, time interval between the transmissions of two bits differs?
  - (a) Asynchronous
  - (b) Synchronous
  - (c) Simplex mode
  - (d) Parallel transmission

13. In which of the following data transmission mode, transmission takes place in both the directions but not simultaneously?
  - (a) Simplex
  - (b) Half duplex
  - (c) Full Duplex
  - (d) Parallel transmission
14. In which of the following process, amplitude of the analog signal is observed at regular intervals?
  - (a) Sampling
  - (b) Quantization
  - (c) Reconstruction
  - (d) Packet switching
15. Which of the following, essentially makes use of HTTP protocol?
  - (a) Internet
  - (b) World Wide Web
  - (c) Computer Network
  - (d) None of the above

**B. Fill in the blanks.**

16. .... is a device, which is used for transmitting computer signals, over normal telephone line.
17. Those computers of Internet, which take services from other computer are called.....
18. IP address comprises of .....numbers separated by dots.
19. .... is a network service that mainly deals with the process of sending and receiving e-mails over network.
20. LAN is acronym of .....
21. WAN is acronym of .....
22. MAN is acronym of .....
23. That topology of network, in which computers are connected to each other in circular fashion, is called ..... topology.
24. In ..... topology, each computer of the network remains physically connected to other computers with a separate medium.
25. OSI is acronym of .....
26. In ..... mode of transmission data is transmitted in one direction.
27. .... is the process, in which the amplitude value of analog signal is converted to digital form.
28. Out of serial and parallel transmission, ..... transmission works faster.
29. Out of serial and parallel transmission, ..... transmission suits well for shorter distances.
30. .... Is popular service of World Wide Web.

**C. State true or false.**

31. Network layer of OSI model deals with routing functions and network congestion.
32. TCP/IP protocol provides the facility to remote login on another computer of the network.



33. NetBIOS/NetBEUI is a network routing device.
34. IPX/SPX is a protocol for networking the computers.
35. Coaxial cables offer better data transfer rates than twisted pair of wires.
36. In coaxial cable, data is transmitted using laser light.
37. Hub is a device, using which multiple computers are connected together over single point.
38. In digital transmission, noise cannot get mixed with the signal.
39. In quantization process, analog signal is rebuild with the help of digital values.
40. In peer to per network model, one computer acts as server and other acts as client.
41. In full duplex mode, data is transmitted in both the directions simultaneously.
42. Internet can be defined as network of computer networks.
43. A to D converters are basically electronic circuits that convert digital signals into analog signals.
44. Voice signal is an example of digital signal.
45. In asynchronous mode of transmission, start and stop bits are added with each character that is transmitted.

**D. Answer the followings question in short.**

46. What are the two main objectives of networking?
47. Name 3 essential components of networking.
48. Name any three mediums, which are generally used for connecting the computers of the network.
49. Name any two variants of LAN.
50. Which type of signal acquires only two amplitude values?
51. Name any four topologies, in which computers of the network could be connected.
52. Draw a block diagram of Ring topology.
53. Draw a block diagram of Star topology.
54. Name any two protocols of networking.
55. Name a medium, in which data is transmitted, using light.
56. In which two modes of transmission, data is transmitted in both the directions in the medium.
57. Name the two processes associated with data transformation.
58. In which type of signal, amplitude continuously varies with time.
59. In which type of network, computers can be places as far as required?
60. Write the full form of TCP/IP.

**Detailed Answer Type Questions**

**E. Answer the following questions in detail:**

61. What is computer network? Draw a block diagram showing basic elements that are required for networking.
62. What do you understand by protocol? What is TCP/IP? Explain its role in computer network.
63. What is LAN? Explain its characteristics, giving suitable example.
64. What do you understand by the term topology? Draw a block diagram of bus topology. State advantages and disadvantages of this topology.
65. What is MAN? How it is different from WAN?
66. Draw a block diagram OSI model for networking. Explain the role of its first three layers.
67. Explain the objective of following:  
(a) FTP            (b) TELNET
68. Explain the role of modem in computer network.
69. What do you understand by client server mode of computing?
70. Describe at least five applications of networking. State their advantages also.
71. What do you understand by topology? How many types of topologies are commonly used? State their advantages and disadvantages.
72. What is SAMBA? What is its role in network?
73. Describe any five network services.
74. Describe the process of transformation of analog signal into digital signal?
75. Differentiate between asynchronous and synchronous transmission.

\*\*\*\*

## **PART II**

# **Computer Application Laboratory**

**Includes theory and solution for practical  
assignments**

- ❑ Windows
- ❑ MS-Word
- ❑ MS-Excel
- ❑ MS-PowerPoint
- ❑ Internet

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# Computer Application Laboratory

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## CHAPTER 5

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### *Windows*

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Windows is the most popular operating system of modern times. It has been designed and developed by Microsoft Corporation of USA. Windows not only activates computer and makes its devices functional, it also provides applications for performing wide variety of tasks on computer. For example, its Notepad program enables you to write letters and notes. Using its Paint program you can draw pictures on computer and color them too. Likewise there are many more programs in Windows. An introduction to its features, functions and applications is given in its chapter.

#### **BOOTING COMPUTER WITH WINDOWS**

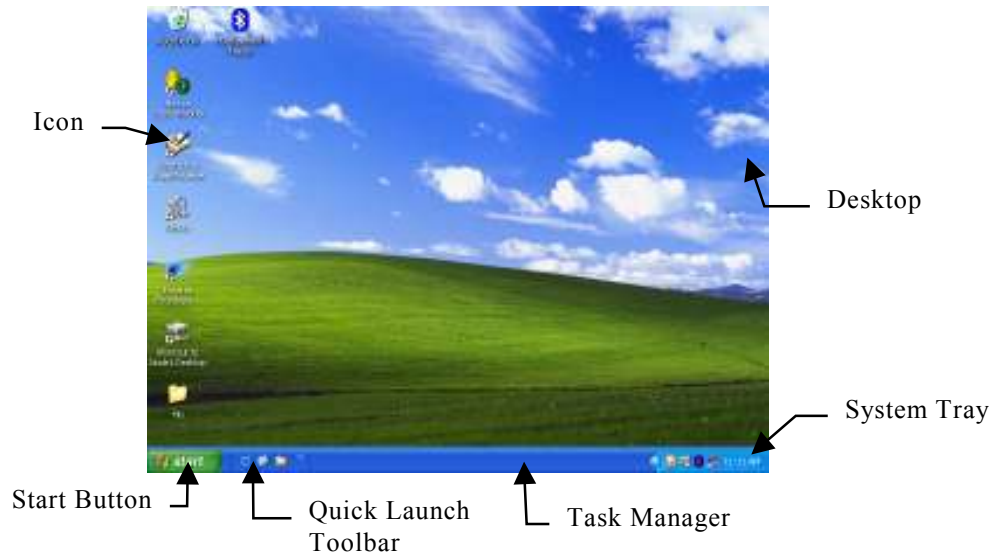
To boot the computer with Windows operating system, first switch the monitor on and then switch on the CPU, using ON/OFF switch present in its chassis.

When you do so, computer will check all its peripherals, if they are functioning properly or not. If any unit is found faulty, an error message appears on the screen and booting process stops. On the other hand, if all the units are found OK, booting process continues. Computer reads the operating system from disk, loads it into memory and displays a dialog box, as shown in figure 5.1.



**Figure 5.1**

This dialog box is part of Windows security system. It asks for login name and password to ensure that only authorized persons use the system. To boot the system, enter your login name and password correctly and click the mouse on "OK" button. After a while, display on the monitor will turn as shown in figure 5.2.



**Figure 5.2**

## INTRODUCTION TO WINDOWS DESKTOP

After booting the system with Windows, the first screen that appears on the monitor is called Desktop. Desktop is illustrated in figure 5.2. A brief introduction of each component of Windows desktop is given below.

### Desktop Icons

Icons are graphical pictures. They represent objects like programs, files, folders etc. Initially few icons appear on desktop. Later, if the need be, more icons are placed on the desktop. To activate any icon, you need to double click the mouse on it.

### Start Button

Start button is the starting point of Windows menu system. When you click the mouse on "Start" button, Start menu, as shown in figure 5.3 appears on the screen. Refer Start menu, shown in figure 5.3 and note the following points:



**Figure 5.3**

1. Some of the options in Start menu have an arrow marked in front of them. This arrow indicates that when you click the mouse on the option, a submenu will appear on the screen.

2. Some of the options have few dots (...) marked in front of them. These dots indicate that when you click the mouse on the option, a dialog box will appear on the screen.
3. Those options that neither have arrow nor dots marked in front of them get directly executed when you click the mouse on them.

## Quick Launch Toolbar

As illustrated in figure 5.2, Quick Launch toolbar comprises of many buttons. Each button represents a program. When you click the mouse on any button, corresponding program gets executed.

## Task Manager

Initially, Task Manager appears as blank area but when you execute any program, a button for that program gets created in this area. This button identifies the program and provides means for performing different operations on the running program. For example, using the button you could terminate the program.

## System Tray

Initially system tray displays few icons and system time in it. Each icon of the system tray represents a program, which is invisibly running in the background. To operate upon a background program, you can double click the mouse on its icon. For example, to set the system date and time, you can double click the mouse on system time icon.

## INTRODUCTION TO WINDOW

Windows operating system drives its name from the fact that each running program, in Windows appears in the form of a window. When you execute a program, a window appears on monitor screen. For example, when you execute WordPad program of Windows, WordPad window, as shown in figure 5.4 appears on monitor screen.

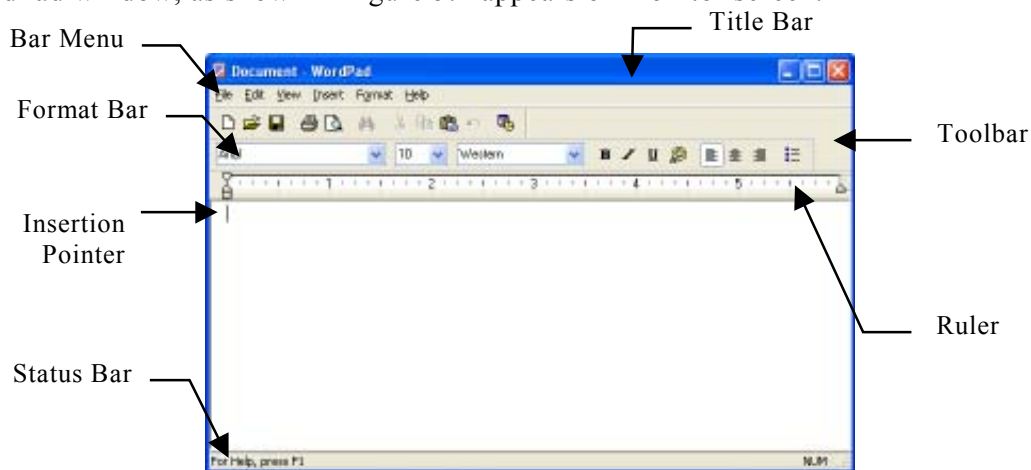


Figure 5.4

Refer figure 5.4 and note that window comprises of many components. Role and function of each component of the window is given below.

## Title Bar

Title bar acts as window header. It comprises of following items:

**System menu button :** When you click the mouse on this button, system menu, as illustrated in figure 5.5 appears on the screen.



**Figure 5.5**

**Program Name :** Name of the program, with which window is related, appears in the title bar. This name identifies the windows. When you have many windows present on the screen, program name in title bar helps you in identifying the window.

**Minimize Button :** It shrinks the window to a button, placed in task bar, when you click the mouse on it.

**Maximize Button :** When you click the mouse on this button, window enlarges to the size of the monitor screen and the button gets converted to Restore button. When you click the mouse on Restore button, enlarged Window gets back to its original size.

**Close Button :** When you click the mouse on this button, program terminates. Its window and task bar button, both get removed from the monitor screen.

## Bar Menu

Bar menu appears as broad strip with multiple options in it. Each option has an underlined character in it. For example, File option has F character, underlined in it. When you select any option, a pull down menu (submenu) appears on the monitor screen. To select any option from the bar menu, either of the following operations can be performed:

1. Click the mouse on the option, which you wish to select.
2. Press Alt key and underlined character key together. For example, to select File option, you could press Alt and F keys together.

## Toolbar

Toolbar comprises of many buttons. Each button performs a specific task, when you click the mouse on it. For example, when you click the mouse on "Save" button, current contents get saved on the disk. When you rest the mouse pointer for some time on any button of the tool bar, its name appears on the monitor screen.

## Status Bar

Status bar appears at the foot of the window. Relevant information, help messages, current activity status etc. get displayed in it.



## **OPERATING UPON A WINDOW**

Any window that appears on the screen can be operated upon in many ways. Following are the operations that can be performed on a window.

### **Moving The Window**

Window can be moved from one place to another on the screen by dragging it with its title bar and dropping it at the desired location.

### **Changing The Size Of The Window**

Dragging the window by its border, changes its length, width or both. For example, if you place the mouse pointer on window's right borderline and drag it towards left/right, its width will decrease/increase. Similarly if you place the mouse pointer on top borderline and drag it above/below, its length will increase/decrease. If you wish to increase/decrease the length and width of the window simultaneously, in proportion, drag the window by placing the mouse pointer on any of its corners.

### **Minimizing The Window**

To minimize a window, click the mouse on its "Minimize" button. When you do so, it shrinks to a button in Task Manager Area and gets removed from VDU.

### **Restoring The Minimized Windows**

To restore a minimized window, right click the mouse on its button present in Task Manager Area. When you do so, a short cut menu, as shown in figure 5.5 appears on the monitor screen.

Select "Restore" option from this menu. When you do so, minimized window returns back to its original status.

### **Maximizing The Windows**

To maximize a window, click the mouse on its "Maximize" button. When you do so, its size gets enlarged to the size of monitor screen and Maximize button gets converted into Restore button.

### **Restoring The Maximized Windows**

To restore the maximized window, click the mouse on Restore button. When you do so, it returns back to its original size and Restore button gets converted into Maximize button.

### **Closing The Windows**

To close the window and terminate the program, click the mouse on its Close button.

# PRACTICAL

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## ASSIGNMENT -1

### ***(a) Starting a Program, Running a program.***

- (i) To start a program from desktop, double click the mouse on an icon, present on desktop. For example, click the mouse on "My Computer" icon present on desktop.
- (ii) To start a program from Quick Launch toolbar, click the mouse on its icon, present in Quick Launch toolbar. For example, click the mouse, on "Internet Explorer" icon.
- (iii) To start a program from System Tray, double click the mouse on its icon that remains present in System Tray. For example, double click the mouse, on Time that gets displayed in System Tray.
- (iv) To start a program from a Start menu, click the mouse on "Start" button and select the desired option from the submenu or submenus that appear thereafter.
- (v) To run a program by specifying its name, first click the mouse on "Start" button and then on "Run" option.

When you do so, a dialog box will appear on screen. Type the name of the program that you wish to run, along with its path name in this dialog box and click the mouse on "OK" button.

### ***(b) Starting Windows in safe mode.***

- (i) To boot the computer with Windows in safe mode, first switch the monitor on and then switch on the CPU.
- (ii) Wait for a while and press F8 key. When you do so, a list of booting options will appear on monitor screen. Select "Safe Mode" option from this list.
- (iii) When you do so, computer will get booted in safe mode.
- (iv) Note that safe mode of Windows is restricted mode. Only few basic operations can be performed in this mode. Usually it is used for system maintenance purpose.

### ***(c) Running multiple programs and switching between windows.***

- (i) Invoke My Computer program, Internet Explorer, Date and Time program, MS-Word program and Notepad program, using methods described in point (a).
- (ii) To switchover from one program to another, perform any one of the following:
  - Click the mouse on program window's title bar.
  - Click the mouse on program's button present in task manager area.
  - Press Alt key and select the name of the program by pressing Tab key as

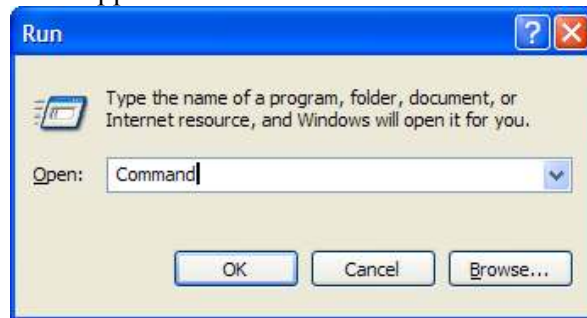
many times as required.

**(d) Moving the window, and the task bar.**

- (i) To move the window, drag it by placing the mouse pointer on its title bar.
- (ii) To move the task bar, drag it by placing the mouse pointer on some blank space of the task bar. Note that you will be able to move it only if it is not locked. Procedure for locking and unlocking the task bar is explained ahead.

**(e) Startup to MS-DOS prompt.**

- (i) Perform following steps, to invoke MS-DOS prompt:
  - Click the mouse on "Start" button. When you do so, Start menu, as shown in figure 5.3 will appear on the screen.
  - Select "Run" option from it. When you do so, a dialog, box, as shown in figure 5.6 will appear on the screen.



**Figure 5.6**

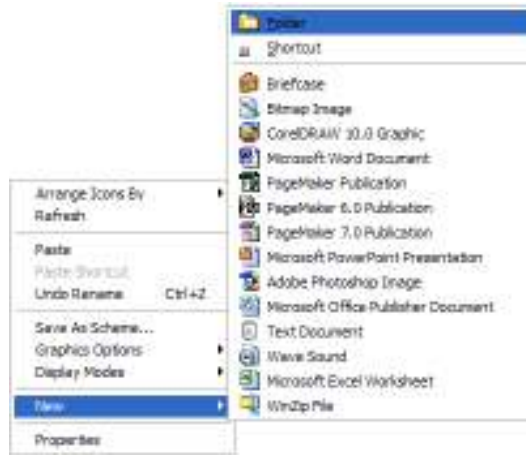
- Now type "Command" in the text box.
- At last, click the mouse on "OK" button.

When you do so, MS-DOS screen will appear for working in MS-DOS. To come back to Windows environment, type "Exit" command on system prompt and press "Enter" key.

## **ASSIGNMENT -2**

**(a) Creating and removing a folder.**

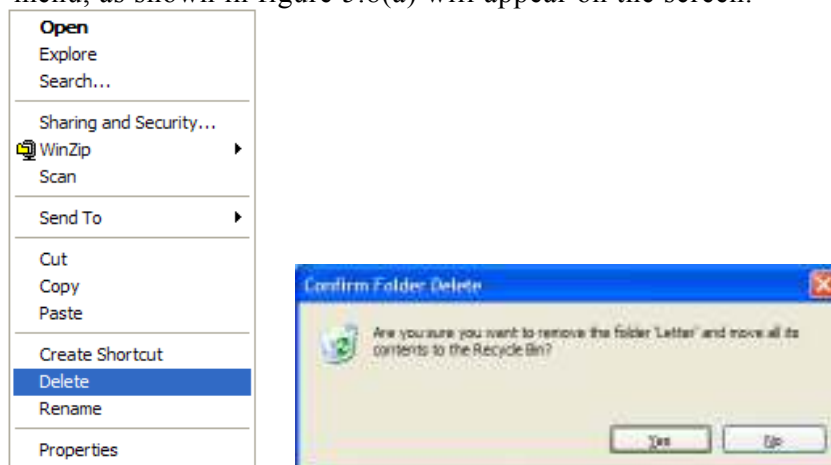
- (i) Perform following steps to create a new folder on desktop:
  - Right click the mouse at some blank space of the desktop. When you do so, a menu as shown in figure 5.7 (a) will appear on the screen.



(a) (b)

**Figure 5.7**

- Now select "New" option from this menu. When you do so, a submenu, as shown in figure 5.7 (b) will appear on the screen.
  - Select "Folder" option from this submenu. When you do so, a new folder will get created on desktop. The name, "**New Folder**" will be automatically assigned to this folder.
  - Now, type the name of your choice and press "Enter" key. For example, type "Letter" if you wish to assign the name Letter to new folder and press "Enter" key.
- (ii) Perform following steps to delete a folder:
- Right click the mouse on the folder, which is to be deleted. When you do so, a menu, as shown in figure 5.8(a) will appear on the screen.



(a) (b)

**Figure 5.8**

- (ii) Now select "Delete" option from this menu. When you do so, a confirmation box, as shown in figure 5.8(b) will appear on the screen.
- If you wish to delete the folder, click the mouse on "Yes" button else click it on "No" button.

Note that when you delete a file or folder then it does not get physically deleted from the disk but it goes and gets stored in Recycle bin. When you delete the file from Recycle bin then only the file gets deleted from the disk. Recycle bin in the form of an icon remains available on your desktop. If you wish, you can recover the deleted items from Recycle bin.

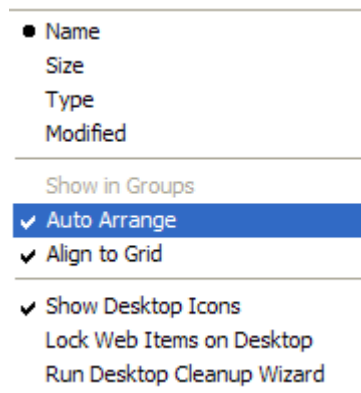
**(b) Making the taskbar wider, arranging icon on the desktop.**

- (i) To make the taskbar wider, place the mouse pointer on upper border of the taskbar. When you do so, mouse pointer will get converted into double-headed arrow.

Now drag the mouse upward. This will make the taskbar wider.

If you perform the same procedure but drag the mouse downwards, the taskbar will become thinner.

- (ii) Perform following steps to rearrange the icons on desktop:
- Right click the mouse on some blank portion of the desktop. When you do so, a shortcut menu, as shown in figure 5.7(a) will appear on the screen.
  - Select "Arrange Icon By" option from this menu. When you do so, another popup menu, as shown in figure 5.9 will get displayed on the screen.



**Figure 5.9**

- Select "Auto Arrange" option from this menu.
- This procedure will rearrange the icons on desktop.

**(c) Displaying and hiding the taskbar clock.**

- (i) Perform following steps for hiding or displaying the system clock in taskbar:
- Right click the mouse on some blank portion of the taskbar. When you do so, a shortcut menu, as shown in figure 5.10(a) will appear on the screen.

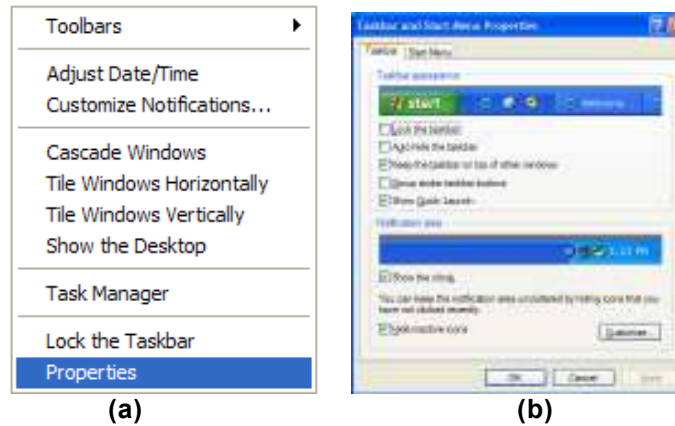


Figure 5.10

- Select "Properties" option from this menu. When you do so, a dialog box, as shown in figure 5.10 (b) will get displayed on the screen.
- Check "Show the clock" check box to display the clock or uncheck it to hide the clock.
- At last, click then mouse on "OK" button.

**(d) Controlling the size of Start menu options:**

- Right click the mouse on some blank portion of the taskbar. When you do so, a shortcut menu, as shown in figure 5.10(a) will appear on the screen.
- Select "Properties" option from this menu. When you do so, a dialog box, as shown in figure 5.10(b) will get displayed on the screen.
- Click the mouse on "Start Menu" tab. When you do so, options within the dialog box will change and "Customize" button will appear in it.
- Click the mouse on "Customize" button. When you do so, a dialog box, as shown in figure 5.11 will appear on the screen.
- Make use of "Number of programs on Start menu:" spinner and set the number of programs that should appear in Start menu.
- Click the mouse on "Advanced" tab and select the names of all those programs that you wish to keep in "Start" menu.
- Click the mouse on "OK" button. When you do so, you will be taken back to the dialog box, shown in figure 5.10(b).
- At last, click the mouse on "OK" button.



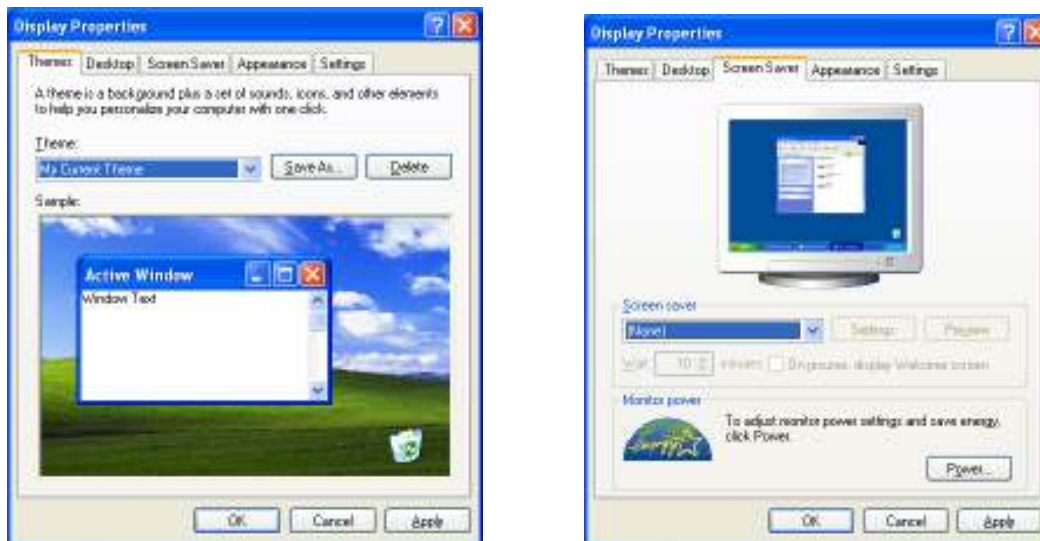
Figure 5.11

**(e) Creating Shortcuts.**

- (i) Perform following steps to create the shortcut of any object whose icon is visible on the screen:
- Right click the mouse on the icon of the program, whose shortcut is to be created. When you do so, a menu, as shown in figure 5.8(a) will appear on the screen.
  - Select "Create Shortcut" option to create the shortcut at the same place where the object is.
  - First select "Send To" option and then "Desktop (create shortcut)" option from the menu that appears thereafter to create the shortcut on desktop.

**ASSIGNMENT -3****(a) Installing a screen saver.**

- (i) Perform following steps to set the screen saver:
- Right click the mouse on any empty place of Desktop. When you do so a menu, as shown in figure 5.7(a) will appear on monitor screen.
  - Now select "Properties" option from this menu. When you do so, a dialog box, as shown in figure 5.12(a) will appear on monitor screen.



(a)

(b)

**Figure 5.12**

- Click then mouse on "Screen Saver" tab. When you do so, another dialog box, as shown in figure 5.12(b) will appear on monitor screen.
- Select the screen saver of your choice from "Screen Saver" drop down list box.

- Now make use of "Wait" spinner and specify the time after which the screen saver should get activated, if no input/output activity takes place. For example, if you specify this limit as 10 minutes and no input/output activity takes place for 10 minutes then screen saver will automatically get activated.
- Using "Settings" button, set other related options. For example, what should be the speed of moving patterns, what should be their shape etc, can be set by clicking the mouse on this button.
- Now click the mouse on "OK" button.

**(b) Assigning wallpaper to Desktop.**

- (i) Perform following steps to set the wallpaper for the desktop:
- Right click the mouse on any empty place of desktop. When you do so, a menu, as shown in figure 5.7(a) will appear on monitor screen.
  - Now select "Properties" option from this menu. When you do so, a dialog box, as shown in figure 5.12(a) will appear on monitor screen.
  - Click the mouse on "Desktop" tab. When you do so, options within the dialog box will change, as shown in figure 5.13.
  - Select the background from Background list box. If some other background than those available in list box, is to be set then make use of "Browse..." button.
  - Now set the position and color, using respective drop down lists present in the dialog box.
  - Now click the mouse on "OK" button.



**Figure 5.13**

**(c) Adding a program to the Start menu.**

- (i) Perform following steps for adding a program to the Start menu:
- Create a shortcut of the program on desktop, using the method describe above.
  - Drag the shortcut and drop it on Start menu.

**(d) Recovering files and folders from Recycle bin.**

- (i) Perform following steps for recovering files and folders from Recycle bin:
- Double click the mouse on "Recycle Bin" icon that remains present on desktop. When you do so, Recycle Bin window with many options and deleted file/folder icons will appear on monitor screen.



- Select icons of all those files and folders, which are to be recovered.
- Now select "Restore" option present in Recycle Bin window.

**(e) Customizing the mouse settings.**

(i) Perform following steps for customizing the mouse settings:

- Click the mouse on "Start" button. When you do so, "Start" menu, as shown in figure 5.3 will appear on the screen.
- Select "Control Panel" option from this menu. When you do so, a window containing many program icons in it will appear on the screen.
- Now double click the mouse on "Mouse" icon. When you do so, a dialog box, as shown in figure 5.14 will appear on the screen.
- Now click the mouse on the tab, related to which you wish to do the settings. For example, if you wish to do mouse pointer related settings, click the mouse on pointer option.
- Select desired option that gets displayed in the dialog box.
- Click the mouse on "OK" button.



**Figure 5.14**

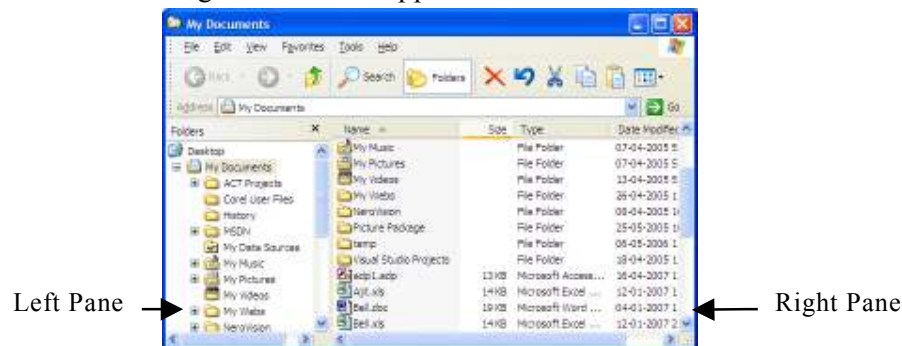
For example, if you wish to do mouse pointer related settings, click the mouse on pointer option.

## ASSIGNMENT -4

**(a) Expanding and collapsing a folder.**

(i) Perform following steps for expanding and collapsing a folder:

- Invoke "Windows Explorer" program (by first right clicking the mouse on "Start" button. and then selecting "Explorer" option from the popup menu that gets displayed thereafter). When you do so, Windows Explorer window, as shown in figure 5.15 will appear on monitor screen.



**Figure 5.15**

Note that the names of the folders get displayed in left pane and contents of the current folder in right pane.

- To expand any folder, click the mouse on + sign that remains present on the left hand side of the folder icon.
- To collapse any folder, click the mouse on - sign that remains present on the left hand side of the folder icon.

**(b) Recognizing file types, using icons.**

(i) Following are the icons that symbolize different types of files and devices:



Represents Floppy drive.



Represents hard disk.



Represents a folder.



Represents executable file.



Represents non-executable files.



Represents data file.



Represents MS-Word file.



Represents MS-Excel file.



Represents MS-Power Point file.



Represents MS-Access file.



Represents sound or video file.

**(c) Running a program from Explorer.**

(i) To run a program from Explorer, double click the mouse on its icon present in right pane of Explorer window.

**(d) Renaming a file or folder.**

(i) Perform following steps for renaming a file or folder:

- Right click the mouse on the icon of the file/folder, which gets displayed in right pane of Windows Explorer. When you do so, a popup menu, as shown in figure 5.8(a) will appear on the screen.
- Select "Rename" option from this menu and type the new name of the file.
- At last press "Enter" key.

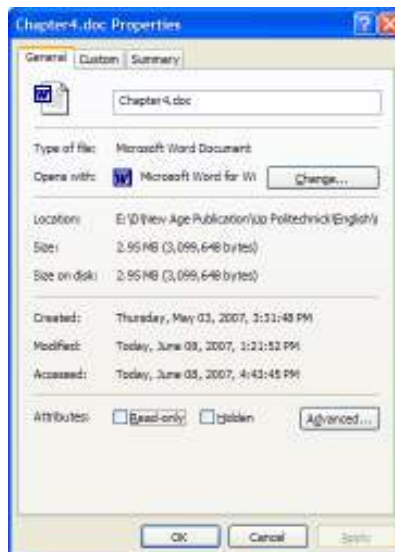
***(e) Selecting two or more files for an operation.***

- (i) Perform following steps for selecting two or more file for an operation:
  - To select contiguous block of files (say from fifth file to eleventh file), press Shift key and first click the mouse on first file (fifth file) of the block and then on the last file (eleventh file) of the block.
  - To select multiple files (say fifth, seventh and ninth file), keep holding Ctrl key and click the mouse on each file that is to be selected (i.e. fifth, seventh and ninth file).

## ASSIGNMENT - 5

***(a) Displaying the properties of a file or folder.***

- (i) Perform following steps for displaying the properties of a file or folder:
  - Right click the mouse on the icon of the file/folder, which gets displayed in right pane of Windows Explorer. When you do so, a popup menu, as shown in figure 5.8(a) will appear on the screen.
  - Select "Properties" option from this menu. When you do so, properties of file and folder will get displayed in a dialog box. Such a dialog box is shown in a figure 5.16.



**Figure 5.16**

***(b) Using cut and paste operations to move a file.***

- (i) Perform following steps for moving a file from one folder to another:
  - Click the mouse on that folder (present in left pane of Windows Explorer window), which contains the file that you wish to move. When you do so, all its files and folder will get displayed in right pane of Windows Explorer window.
  - Right click the mouse on the file (present in right pane of Windows Explorer window) that is to be moved. When you do so, a popup menu, as shown in figure 5.8(a) will appear on the screen.
  - Select "Cut" option from this menu.
  - Now right click the mouse on that folder (present in left pane of Windows Explorer window), in which the file is to be moved. When you do so, a popup menu, as shown in figure 5.8(a) will appear on the screen.
  - Select "Paste" option from this menu.

***(c) Using copy and paste operations to copy a file.***

- (i) Perform following steps for copying a file from one folder to another:
  - Click the mouse on that folder (present in left pane of Windows Explorer window), which contains the file that you wish to copy. When you do so, all its files and folder will get displayed in right pane of Windows Explorer window.
  - Right click the mouse on the file (present in right pane of Windows Explorer window) that is to be copied. When you do so, a popup menu, as shown in figure 5.8(a) will appear on the screen.
  - Select "Copy" option from this menu.
  - Now right click the mouse on that folder (present in left pane of Windows Explorer window), in which the file is to be copied. When you do so, a popup menu, as shown in figure 5.8(a) will appear on the screen.
  - Select "Paste" option from this menu.

***(d) Moving and copying files with mouse.***

- (i) For moving the file from its current location to another folder, drag the file icon with Shift key pressed and drop it on the folder, in which the file is to be moved.
- (ii) For copying the file from its current location to another folder, drag the file icon with Ctrl key pressed and drop it on the folder, in which the file is to be copied.

***(e) Sorting a folder.***

- (i) Perform following steps for sorting a folder:
  - Click the mouse on that folder (present in left pane of Windows Explorer

window), contents of which are to be sorted. When you do so, all its files and folder will get displayed in right pane.

- Select "View" option from bar menu. When you do so, View menu will appear on the screen.
- Select "Arrange Icons by" option from View menu. When you do so, another menu will appear on the screen.
- Now select option as per your requirement (Name, Size, Type, Modified etc.) from this menu.

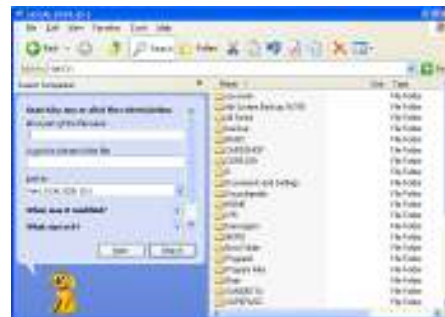
## ASSIGNMENT - 6

### (a) Finding a file or folder by name.

- Perform following steps for finding a file or folder, by name:
  - Click the mouse on "Search" button present in Standard toolbar of Explorer window. When you do so, few options appear in left pane of Windows Explorer window. These options are shown in figure. 5.17(a).



(a)



(b)

Figure 5.17

- Select "All Files and Folders" option. When you do so, a dialog box, as shown in figure 5.17(b) will appear in left pane.
- Type the name of that file or folder, whose presence is to be searched, in "All or part of the disk file name" text box.
- At last click the mouse on "Search" button.

### (b) Defragmenting the disk using disk defragmenter.

- Perform following steps for defragmenting the disk, using disk defragmenter:
  - Click the mouse on "Start" button. When do so, Start menu, as shown in figure 5.18 (a), will appear on the screen.
  - First select "All Programs" option from this menu and then "Accessories", then "System Tools" and then "Disk Defragmenter" option from the submenus that appear one after the other.
  - When you do so, a dialog box, as shown in figure 5.18(b), will appear on the screen.

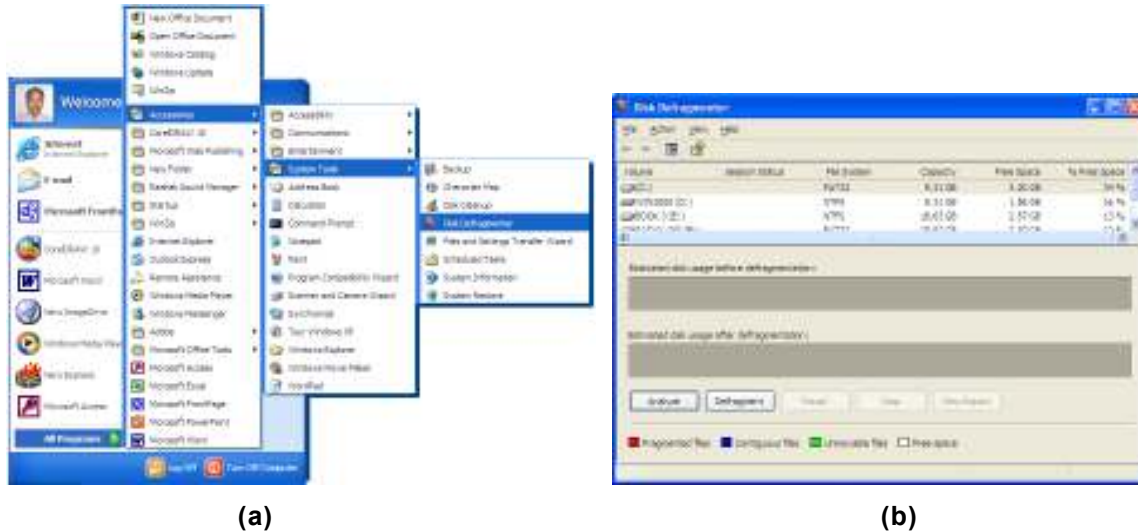


Figure 5.18

- Click the mouse on "Defragment" button.

When you do so, Windows will start the defragmentation process. Note that defragmentation is a long and time-consuming process. Total time taken to defragment the whole disk will depend upon the size of the disk and file population on it.

**(c) Compressing a file using WinZip.**

- (i) Perform following steps for compressing a file, using WinZip:
  - Right click the mouse on file/folder, which is to be compressed. When do so, a menu, as shown in figure 5.19(a), will appear on the screen.

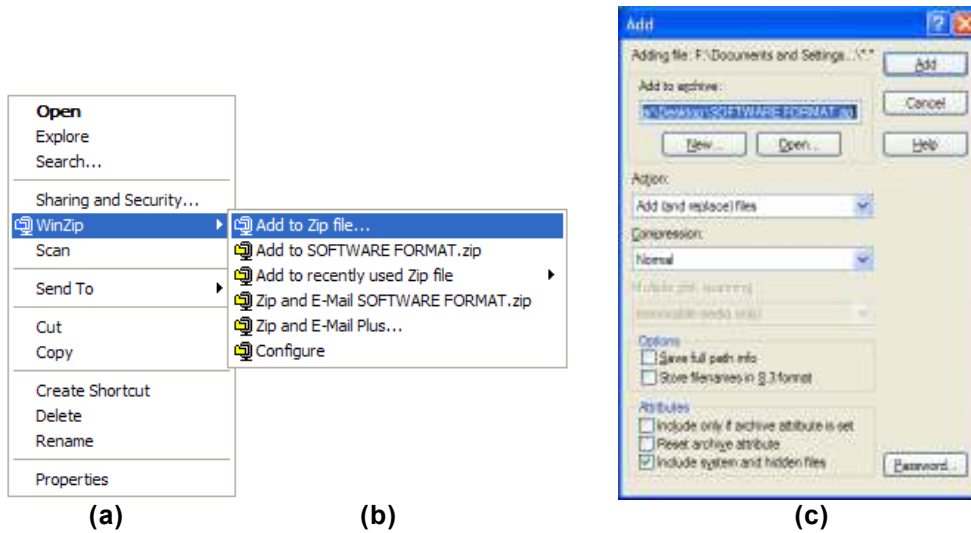


Figure 5.19

- Now select "WinZip" option from this menu. When you do so, another menu, as shown in figure 5.19(b) will appear on the screen.
- Now select "Add to Zip file..." option from this submenu. When you do so, a dialog box, as shown in figure 5.19(c) will appear on the screen.
- Enter the name that you wish to assign to the compressed file in "Add to archive" text box.
- Click the mouse on "Add" button. When you do so, WinZip window will appear on the screen.
- Now close this window.

**(d) Controlling the speaker volume.**

- (i) Perform following steps for controlling the speaker volume:
  - Click the mouse on speaker icon that remains present in system tray. When you do so, a slider, as shown in figure 5.20 will appear on monitor screen.

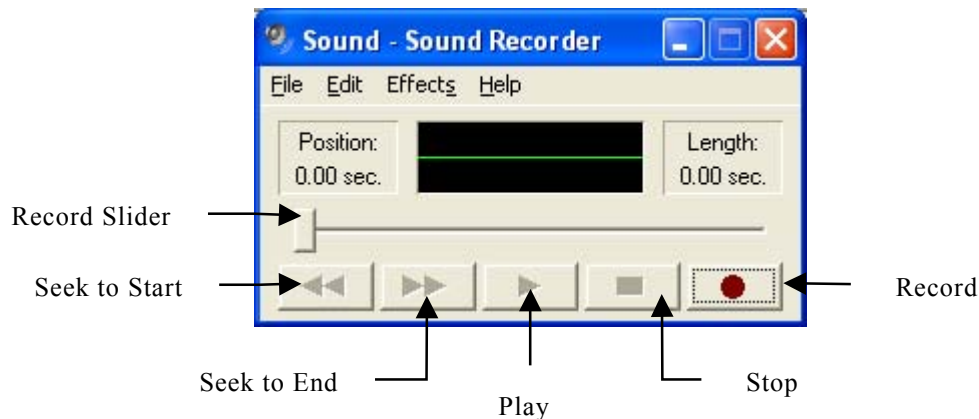


**Figure 5.20**

- Drag the slider upwards for increasing the volume. Dragging it down will decrease the volume.

**(e) Recording and saving an audio file.**

- (i) Perform following steps for recording and saving an audio file:
  - Click the mouse on "Start" button. When you do so, a menu, as shown in figure 5.18(a) will appear on the screen.
  - Select "All Programs" option from this menu. When you do so, a submenu, as shown in figure 5.18(a) will appear on the screen.
  - Select "Accessories" option from this submenu. When you do so, a submenu, as shown in figure 5.18(a) will appear on the screen.
  - Select "Entertainment" option from this submenu. On doing so, another submenu will appear on the screen.
- (ii) Now, select "Sound Recorder" option from this submenu. On selecting this option, sound recorder will appear on the screen, as shown in figure 5.21.

**Figure 5.21**

- To start recording the sound, click the mouse on "Record" button. When you do so, recording will start and the record slider will start moving forward. Whatever will be spoken or sung in front of microphone, will get recorded.
  - In order to stop the recording, click the mouse on "Stop" button.
  - To play the sound that you just recorded, click the mouse on "Play" button. When you do so, you will hear the recorded sound through speakers.
  - After playing the sound once, if you wish to go to the beginning of the recording, click the mouse on "Seek to Start" button. Similarly if you wish to go to the end of the recording, click the mouse on "Seek to End" button.
- (ii) Perform following steps for saving the recording in a file
- Select "File" option from the bar menu of the sound recorder. When you do so, File submenu will appear on the screen.
  - Select "Save" or "Save As" option from File submenu. When you do so, a dialog box, will appear on the screen.
  - From this dialog box, select the name, the drive and folder, in which you wish to save the file.
  - Type the name of the file in "File name" text box.
  - Now click the mouse on "Save" button. When you do so, the sound file will get stored in the specified file.

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# Computer Application Laboratory

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## CHAPTER 6

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### *MS-WORD*

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MS-Word is word processing software that has been designed and developed by Microsoft Corporation of USA. It is mainly used for entering the text in computer and formatting it in presentable form. Its working details are described in this chapter.

#### **OPENING A NEW DOCUMENT AND TYPING THE TEXT**

For getting started with MS-Word, perform following steps:

1. Click the mouse on "Start" button. When you do so, a menu, as shown in figure 6.1(a) will appear on the screen.
2. Select "All Programs" option from this menu. When you do so, a submenu, as shown in figure 6.1(b) will appear on the screen.
3. Select "Microsoft Word" option from this submenu.

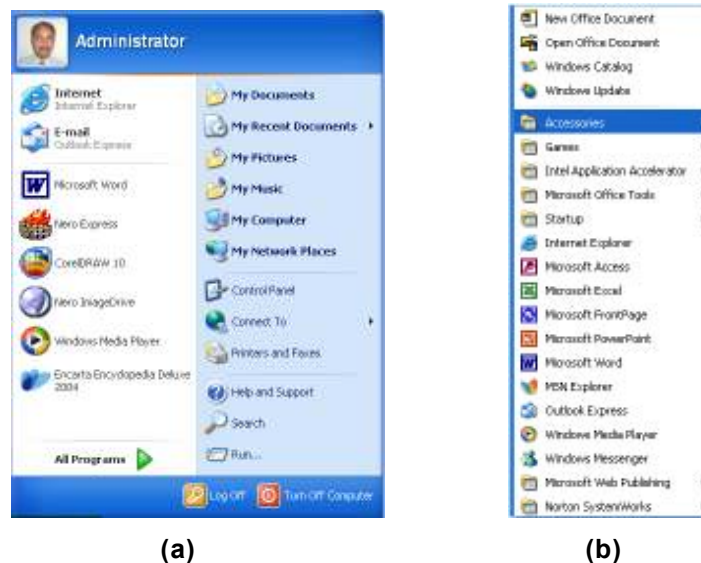
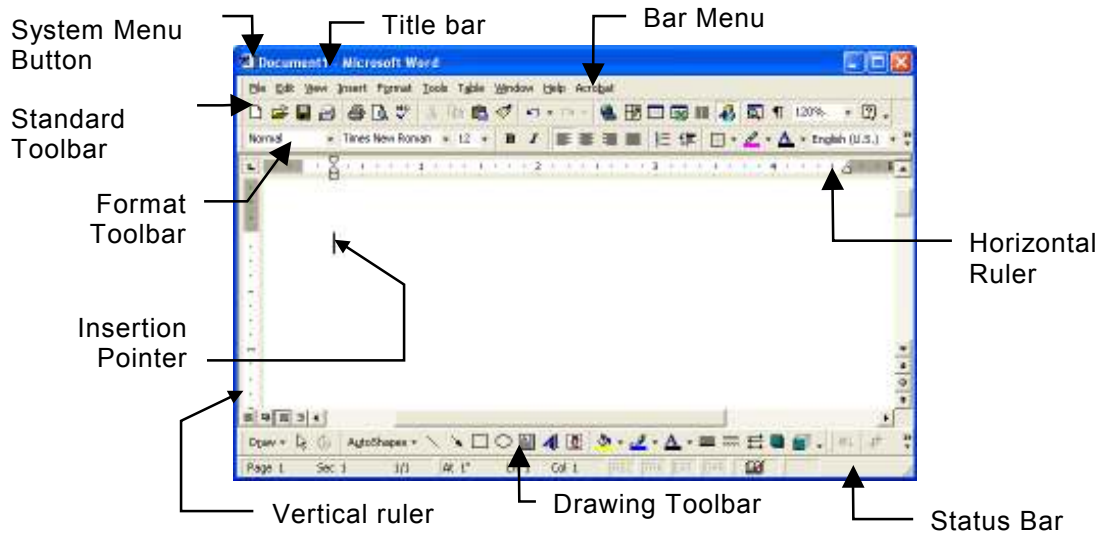


Figure 6.1

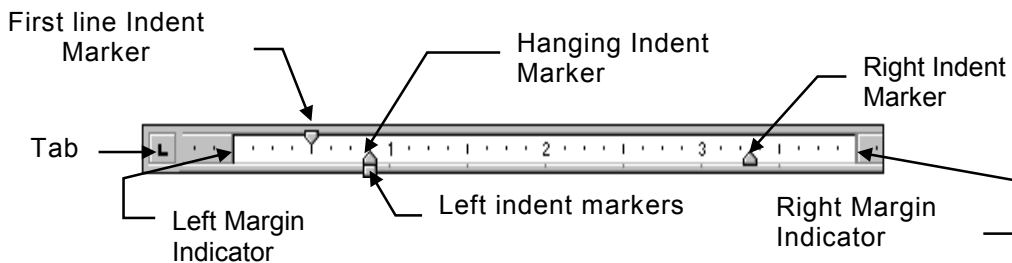
When you do so, a window, as illustrated in figure 6.2 will appear on the screen. This window is called Word Window.



**Figure 6.2**

## PAGE LAYOUT SETTING

The process of setting the margins and paragraphs etc. is called page setting. Rulers are the best medium for setting the page layout. An exclusive view of horizontal ruler is shown in figure 6.3.



**Figure 6.3**

### Setting Left and Right Margins

Left and Right Margins indicators are used for setting respective margins of the document. For example, if Right Margin Indicator's position is set to one inch then the width of the left margin, for the whole document will be one inch. To change the width of the margin, you can drag the respective indicator to the desired place, with the help of mouse.

### Setting Hanging Indent For Paragraph

Usually all the paragraphs of the document start from left margin but Hanging Indent

Marker provides the facility to start the current paragraph from a different position. It could be dragged to a new position to define the starting place for the current paragraph. For example, if the right margin has been set to 1 inch and Hanging Indent Marker has been positioned at 1.5 inch then all the paragraphs other than the current paragraph will start from 1 inch but the current paragraph will start from 1.5 inch.

### **Setting First Line Indent**

First line Indent Marker provides the facility to start the first line of the paragraph from a place other than that from where rest of the lines of the paragraph start. For example, all the lines of the paragraph may start from the left margin (say 1 inch) but first line for the paragraph may start from 1.5 inch from the left margin. To set the position of the first line of the paragraph, First Line Indent Marker can be dragged to the desired position.

### **Setting Left Indent**

Left Indent Marker facilitates simultaneous movement of First line Indent Marker and Hanging Indent Marker. When you drag it, both the markers move together in the same direction and by the same distance.

### **Setting Tab**

Tab button, present in horizontal ruler, facilitates setting of tab positions for the Tab key. To set the tab positions, first click the mouse on Tab button and then click it at the desired position in the ruler. This will put a mark in the ruler and set the tab position. When you press the tab key, insertion pointer will jump to the set-tab-position. For example, if you set the tab positions at 3, 5 and 7 inches then pressing the Tab key once will take the mouse pointer to a place 3 inches away from left margin. When you press it again it will move 5 inches away and if you press it again, it will move it by 7 inches. To remove a tab position, drag the tab mark and drop it off the ruler.

## **TYPING THE TEXT**

When you press any key of the keyboard, character gets typed at current cursor position. Thus by pressing different keys of the keyboard, you can type the complete letter, document, or report.

While entering the text, when insertion pointer reaches the right margin, it automatically gets placed in first column of the next line. When current VDU screen becomes full of text, document automatically shifts upwards (this process is called scrolling) and blank line appears at the bottom of the screen, where you could further enter the text.

When current page becomes full, insertion pointer gets automatically placed at the beginning of the next page. Thus, continuing in this way, you can enter the text, page after page.

While entering the text, you can always make use of Del and Backspace keys to erase characters, words or sentences.

To insert the text in between two characters, words, sentences or paragraphs, click the mouse at the place where the text is to be inserted. When you do so, insertion pointer will get placed there. Now whatever you type, will get typed in between and the text on the right hand side will automatically shift.

To overwrite on already entered text, first double click the mouse on OVR button, present in status bar and then type the text. To come back to Insert mode, click the mouse on the same button again.

To start a new paragraph, press Enter key.

## SAVING THE TEXT IN A FILE

Perform following steps to save the text in a file:

1. Select "File" option from bar menu. When you do so, File submenu will appear on the screen.
2. Now select "Save" option from the File submenu. When you do so, a dialog box, as illustrated in figure 6.4, will appear on the screen.
3. Select the drive and the folder, in which the file is to be saved.
4. Enter the name of the file in "File Name" text box.
5. Click the mouse on "Save" button.



**Figure 6.4**

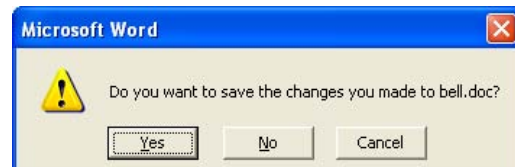
When you do so, current text will get saved on the selected disk, in specified folder and file.

## CLOSING THE FILE

Perform following steps to close currently opened file:

1. Select "File" option from the bar menu. When you do so, File submenu will appear on the screen.
2. Select "Close" option from File submenu.

If no additions or modifications have been made in the document, ever since it was last saved, file will get closed. On the other hand, if they were made, an Alert box, as illustrated in figure 6.5, will appear on the screen.



**Figure 6.5**

3. Click the mouse on "YES" button, if you wish to save the additions and modification on the disk. Select "No" button for not saving them. If you wish to cancel the idea of closing the file, click the mouse on "Cancel" button.

Whatever text you save in the file, remains permanently available for use.

## EDITING OPERATIONS

After opening the file, you may wish to make few modifications in it. For example, you may wish to delete few lines or you may wish to copy a part of the text from one place to another or you may wish to move few lines of paragraphs from here to there. For performing all such types of editing operations, you will have to first select the text, on which you wish to perform the operation. MS-Word provides different mechanisms for selecting different portions of the text. They are explained below.

### Selecting The Text

To select any portion of the text, drag the mouse over it. To cancel the selection either click the mouse anywhere in the document or press any arrow key of the keyboard.

### Deleting The Text

Different parts of the text can be deleted differently. Various deletion operations are explained below:

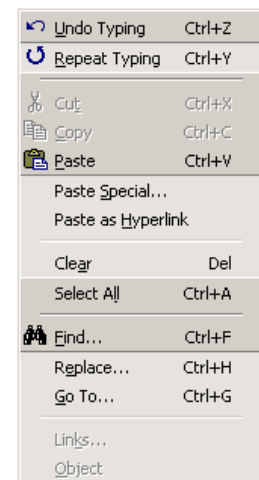
1. To delete a word after the insertion pointer, press CTRL and DEL keys together.
2. To delete a word before the insertion pointer, press CTRL and Backspace keys together.
3. To delete a desired portion of text (either text or graphics), select it, using any of the methods mentioned above and then press DEL key.

### Copying The Text (Copy And Paste)

Often while entering the text, you may wish to copy certain portion of the text (that has already been typed) to another place, so that you don't have to type the matter again. For this, you need to perform following steps:

1. Select the text that you wish to copy.
2. Select "Edit" option from the bar menu. On doing so, Edit submenu, as shown in figure 6.6, will appear on the screen.
3. Select "Copy" option from this submenu.
4. Now take the insertion pointer to the place, where you wish to copy the selected text.
5. Select "Edit" option again from the bar menu and get Edit submenu, as shown in figure 6.6, on the screen.
6. Now select "Paste" option from this submenu.

When you do so, selected text will get copied at current insertion pointer's position.

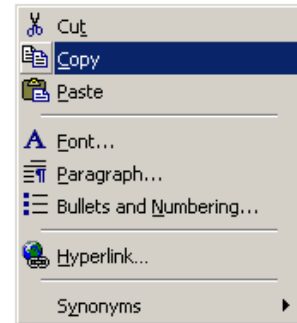


**Figure 6.6**

## Moving The Text (Cut And Paste)

Often while entering the text, you may wish to change the location of certain portion of the text. For this, you need to perform Paste operation, as mentioned below.

1. Select the text that you wish to move to other location of the document.
2. Now right click the mouse on selected portion. When you do so, a popup menu, as shown in figure 6.7 will appear on the screen.
3. Select "Cut" option from this menu.
4. Now take the insertion pointer to that part of the document, where the text is to be moved.
5. Right click the mouse again and get the popup menu, shown in figure 6.7, on the screen.
6. Select "Paste" option from this menu.



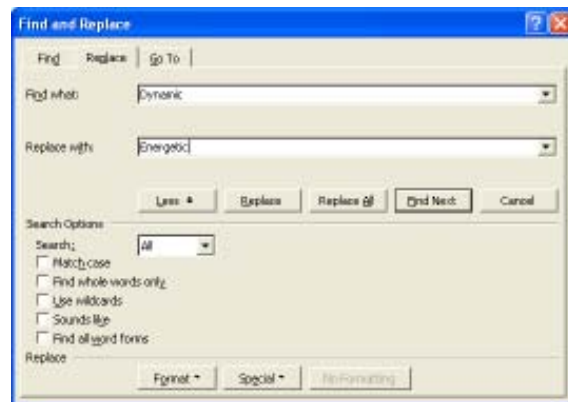
**Figure 6.7**

When you do this, selected text will shift its place from its original position to current insertion pointer's position.

## Replacing The Word With Another Word

To find the occurrence of a word and replacing it with another word, MS-Word provides replace facility. Replacement of a word, using this facility can be done as mentioned below:

1. Select "Edit" option from the bar menu. When you do so, Edit submenu, as shown in figure 6.6, will appear on the screen.
2. Select "Replace..." option from Edit submenu. When you do so, a dialog box, as shown in figure 6.8, will appear on the screen.
3. Enter the word that is to be replaced, in "Find What" text box. For example, you enter the word, "Dynamic" in it.
4. Enter the new word in "Replace with" text box. For example, if you wish to replace the word "Dynamic" with the word "Energetic", enter "Energetic" in "Replace with" text box.
5. If you wish to specify more details related to replacement, click the mouse on "More" button. When you do so, other options will appear on the screen.



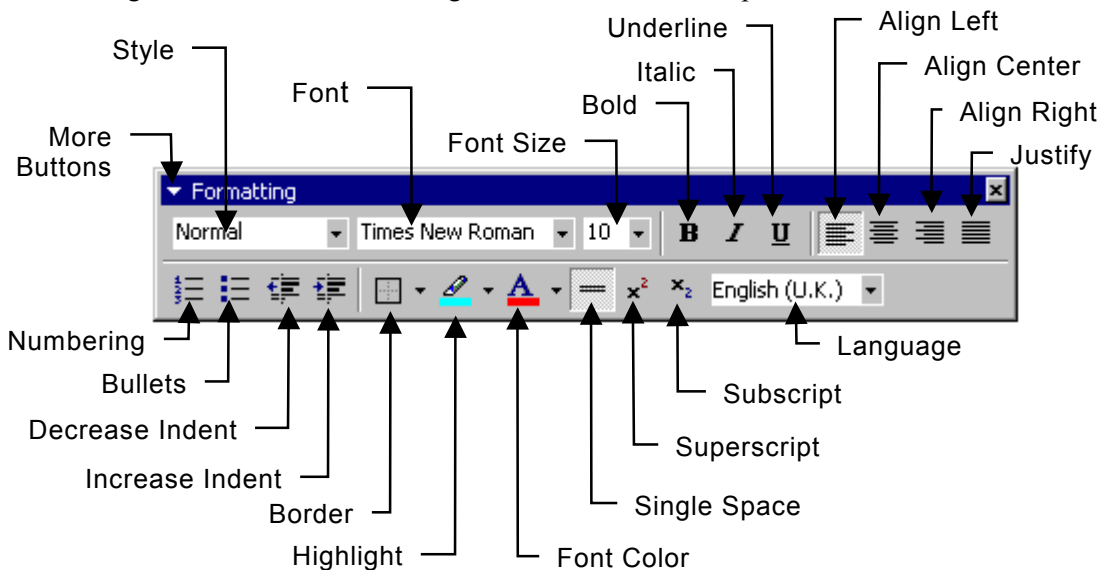
**Figure 6.8**

6. For replacing the single occurrence of the word, click the mouse on "Replace" button and for changing all the occurrences in one-go, click it on "Replace All" button.

When the Replacement operation is over, "Cancel" button automatically changes to "Close" button. By choosing "Close" button, you can close the search operation and return back to the document.

## FORMATTING THE TEXT

Formatting the document means arranging the contents of the document (such as text, graphics etc.) in such a way that the document looks attractive. For example, changing the font, font size, line spacing, paragraph spacing etc. are the activities, which fall into the category of formatting. In MS-Word, formatting operations are done using Format toolbar that remains present in Word window. Format toolbar is shown in figure 6.9. How formatting functions are done using Format toolbars is explained below.



**Figure 6.9**

To perform any formatting function, select the text, which is to be formatted and click the mouse on the corresponding button.

For example, if you wish to make the first two lines of the text bold, select them and then click the mouse on "Bold" button present in Format toolbar.

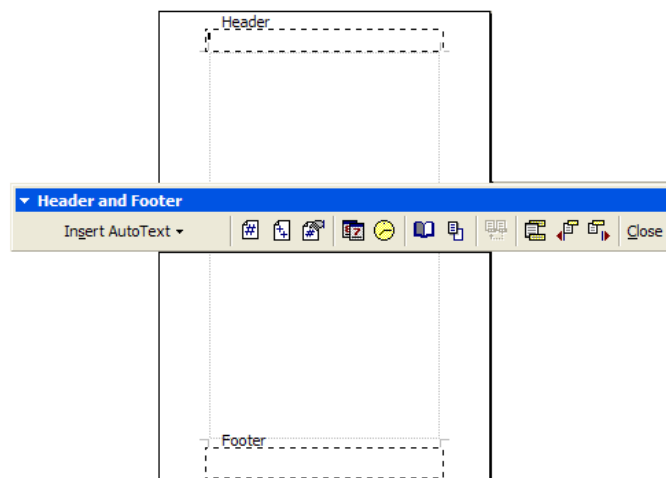
To make a bullet list enter each item of the list in a new line, select all the items and click the mouse on "Bullets" button (to remove the bullet, select the list and click the mouse on same button).

Similarly you can perform other formatting operations.

## Header Footer and Page Number

Header or Footer are the items like text, graphic or number, which are printed on top or bottom of every page of the document, respectively. Perform following steps to introduce them in the document:

1. Select "View" option from the bar menu. When you do so, View submenu, will appear on the screen.
2. Select "Header and Footer" option from View submenu. When you do so, header and footer toolbar along with Header/Footer edit box, as shown in figure 6.10, will appear on the screen.



**Figure 6.10**

3. Whether the forthcoming entry will be for header or footer, define that by clicking the mouse on "Switch Between Header and Footer" button, as it alternates between them.
  4. Enter header/footer text in the respective area.
  5. If you wish to include current date or time as header or footer, click the mouse on respective buttons present in "Header and Footer" toolbar.
  6. To include the page number, take the insertion pointer to that place, where you wish the page numbers to appear and then click the mouse on "Page Number" button, present in "Header" toolbar.
  7. Generally the page numbers start from 1 and are numbered as 1, 2, 3 etc. In case you want them to start from some other number or want them to appear in different format, such as (a, b, c etc.), click the mouse on "Format Page Number" button. When you do so, another dialog box will appear on the screen. Define all the options of your choice through that dialog box.
  8. At last, click the mouse on "Close" button.
- When you do so, defined header, footer page numbers etc. will be visible in the pages.



## Introducing Borders And Shading

Perform following steps to introduce borders around the selected text and shading in it:

1. Select the text, around which the border is to be introduced.
2. Select "Format" option from the bar menu. When you do so, Format submenu will appear on the screen.
3. Select "Borders and Shading..." option from Format submenu. When you do so, a dialog box, as shown in figure 6.11, will appear on the screen. Somehow, if the options being displayed within the dialog box are different, click the mouse on "Borders" tab.
4. Select the border type, mentioned under "Setting" section of this dialog box. Somehow, if the border is to be removed, select "None" option.
5. Select the style, color and width or the line, using which the border is to be made, through "Style", "Color" and "Width" drop down list boxes respectively.

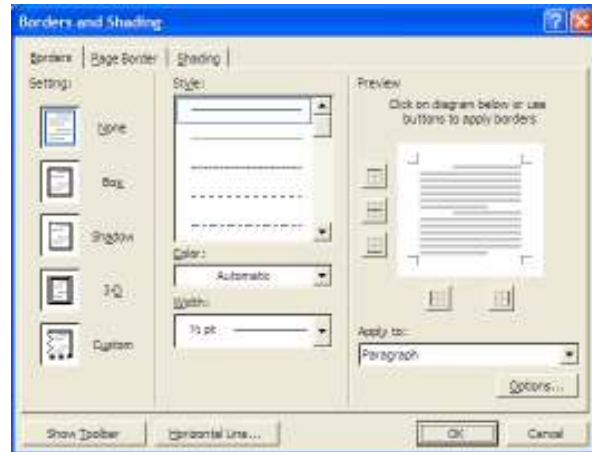


Figure 6.11

## Introducing Shading

6. Click the mouse on "Shading" tab. When you do so, options shown within the dialog box will change as shown in figure 6.12.
7. Select the color, using which the background of the border is to be shaded. If somehow shading is to be removed, select "No Fill" option.
8. Select pattern of the color, using "Style" drop down list box.
9. At last, click the mouse on "Ok" button.

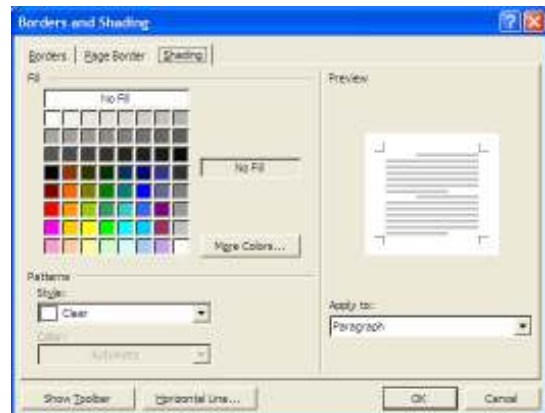


Figure 6.12

When you do so, border with selected colored background will get introduced around the selected text.

## Columns

Instead of text running in straight lines from left margin to right margin, it can be arranged

in columns, as is done in newspapers and magazines. Perform following steps to arrange the text in multiple columns:

1. Select the text that is to be arranged in columns.

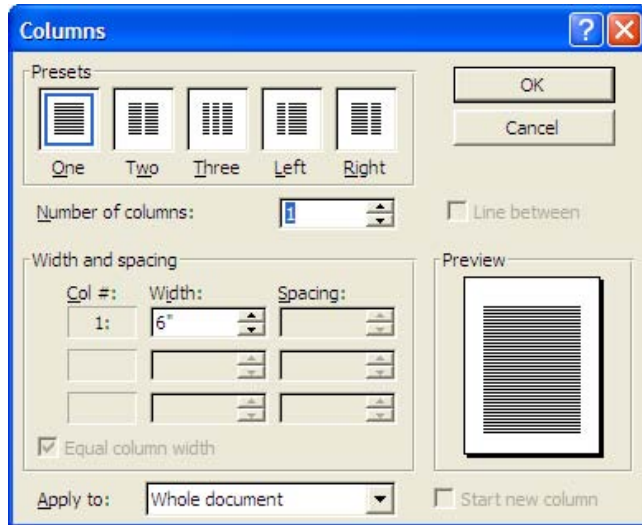
2. Select "Format" option from the bar menu. When you do so, "Format" submenu will appear on the screen.

3. Select "Columns" option from Format submenu. When you do so, a dialog box, as shown in figure 6.13, will appear on the screen.

4. Select the number of columns that have to appear across the width of the page by clicking the mouse on desired option present in "Preset" section of this dialog box.

5. Select the width of the column and spacing between the columns, using respective spinners present in this dialog box.

6. At last, click the mouse "OK" button. When you do so, text will get arranged in columns.



**Figure 6.13**

To remove the columns and arrange the text in normal fashion, perform above mentioned procedure again but select single column option this time, while selecting the number of columns for the page.

## Case Conversion

Perform following steps to make case related conversions in the typed text:

1. Select the text, in which case conversion is to be done.

2. Now select "Format" option from the bar menu. When you do so, Format submenu, will appear on the screen.

3. Select "Change Case..." option from Format submenu. When you do so, a dialog box, as shown in figure 6.14 will appear on the screen.

4. Select the desired option from this dialog box and click the mouse on "OK" button.

When you do so, case of the selected text will change accordingly. The effect of each type of case conversion is shown in table 6.15



**Figure 6.14**

Option	Example	Remark
Original Text	good Morning	
Sentence case	Good Morning	First character of sentence gets converted into capital letter.
Lower case	good morning	All alphabets get converted to lower case.
Upper case	GOOD MORNING	All alphabets get converted to upper case.
Title case	Good Morning	First alphabet of each word gets converted to upper case.
tOGGLE cASE	GOOD mORNING	Lower case alphabets get converted to upper case and upper case alphabets get converted to lower case

Table 6.15

## Page Breaks

When you enter the text in MS-Word and the current page becomes full, it automatically introduces a page break, called soft page break. It takes the mouse pointer to the beginning of the next page so that whatever you type now, gets typed on the next page. Apart from soft page breaks, you can also introduce additional page breaks, at any desired location of the document. These page breaks are called hard page breaks. Perform following steps to introduce a hard page break, at desired location:

1. Position the insertion pointer, at the place, where you wish to introduce the page break.
2. Select "Insert" option from the bar menu. When you do so, Insert submenu, as shown in figure 6.16, will appear on the screen.
3. Select "Break..." option from Insert submenu. On selecting this option, a dialog box, as shown in figure 6.17, will appear on monitor screen.
4. Select "Page Break" option from this dialog box.
5. At last, click the mouse on "OK" button.

When you do so, this page break will appear like dotted line, in the Normal view mode.

All types of page breaks appear as thick line in Print Layout View mode.

To remove hard page break, select the page break in Normal view mode by clicking the mouse on it and then press Backspace or Del key.

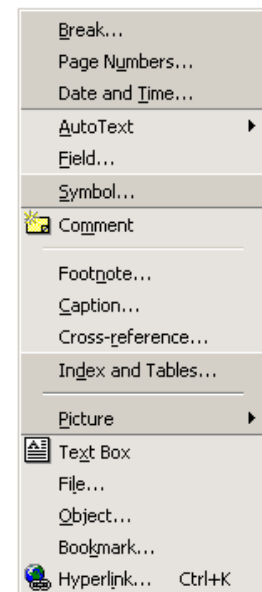


Figure 6.16

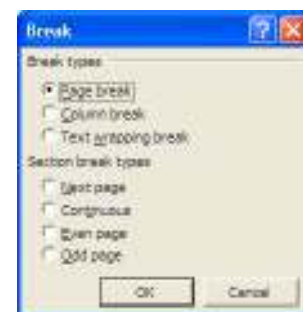


Figure 6.17

## INTRODUCTION TO TABLE

Tables are the best means for illustrating classified data. They consist of rows and columns. A blank table is shown in figure 6.18. The unit space formed by the intersection of rows and column is called cell. Thus a table consisting of 3 rows and 4 columns will have 12 cells in it. MS-Word provides facility for creating tables and entering data in them. The method of creating the table and entering data is given below:


4 columns

3 Rows

**Figure 6.18**

### Creating A Blank Table

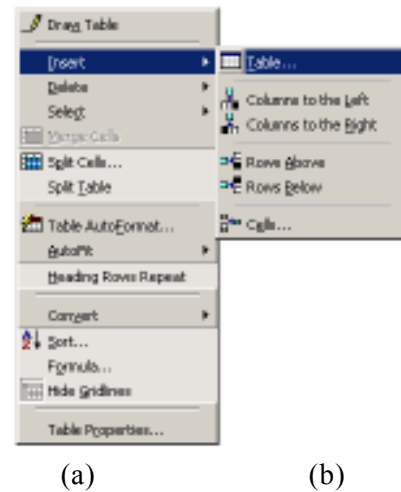
Perform following steps to create a blank table in the document:

1. Place the insertion pointer at the place, where the table is to be created.
2. Select "Table" option from the bar menu. When you do so, "Table" submenu, as shown in figure 6.19(a), will appear on the screen.
3. Select "Insert" option from Table submenu. On selecting this option, another submenu, as shown in figure 6.19(b), will appear on the screen.
4. Now select "Table" option from this submenu. When you do so, a dialog box, as shown in figure 6.20, will appear on the screen.
5. Make use of different spinners present in the dialog box and specify the dimension of the table. Say you specify 4 column and 3 rows.
6. At last, click the mouse on "OK" button.

When you do so, a blank table structure, as shown in figure 6.18, will get created.

### Drawing The Table

Instead of making a table by adopting the procedure mentioned above, you can directly draw a table using "Draw Table" option of Table submenu. Perform following steps to draw a table of your choice:



**Figure 6.19**



**Figure 6.20**

1. Select "Table" option from the bar menu. When you do so, "Table" submenu, as shown in figure 6.19(a), will appear on the screen.
2. Select "Draw Table" option from Table submenu. On selecting this option, Table and Border toolbar, as shown in figure 6.21 appears on the screen.
3. Make use of different tools of this toolbar and draw the table of your choice by dragging the mouse.

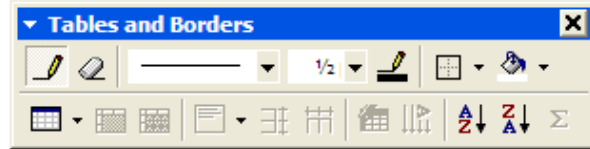


Figure 6.21

### Entering Data In Table

To type the data in the table, click the mouse in desired cell and start typing the data from keyboard. Using arrow keys, you can move within the cell. Pressing Tab key moves insertion pointer ahead by 1 cell, while Shift and Tab keys pressed together take the insertion pointer back by one cell.

### Inserting A Row

Perform following steps to insert a row in an already existing table:

1. Place the insertion pointer in the row, above which you wish to insert a new row.
2. Select "Table" option from the bar menu. When you do so, a Table submenu, as shown in figure 6.19(a), will appear on the screen.
3. Select "Insert" option from this submenu. On selecting this option, another submenu, as shown in figure 6.19(b), will appear on the screen.
4. Now select "Row Above" option from this submenu.

When you do so, a blank row, above the insertion pointer will get created in the table.

### Inserting A Column

To insert a column in an already existing table, place the insertion pointer in the column, left to which, a new column is to be inserted. After this, perform all the steps mentioned in "Inserting a row" section but select "Column to the Left" option instead of "Row above" option in step (4).

### Deleting Table Or Row Or Column

Perform following steps to delete the table, row(s) /column(s):

1. Select the table or row or column that is to be deleted.
2. First select "Table" option from the bar menu. When you do so, Table submenu, as shown in figure 6.19 (a) will appear on monitor screen.
3. Select "Delete" option from Table submenu. When you do so, another submenu, as shown in figure 6.22, will appear on monitor screen.
4. Select "Table", "Rows" or "Columns" option from this submenu.

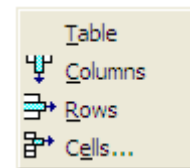


Figure 6.22

When you do so, the selected table, row or column will get deleted.

If you wish to delete the contents of the table/rows/columns and not the entire table/row/column, select the contents and press Del key.

## Merging The Cell

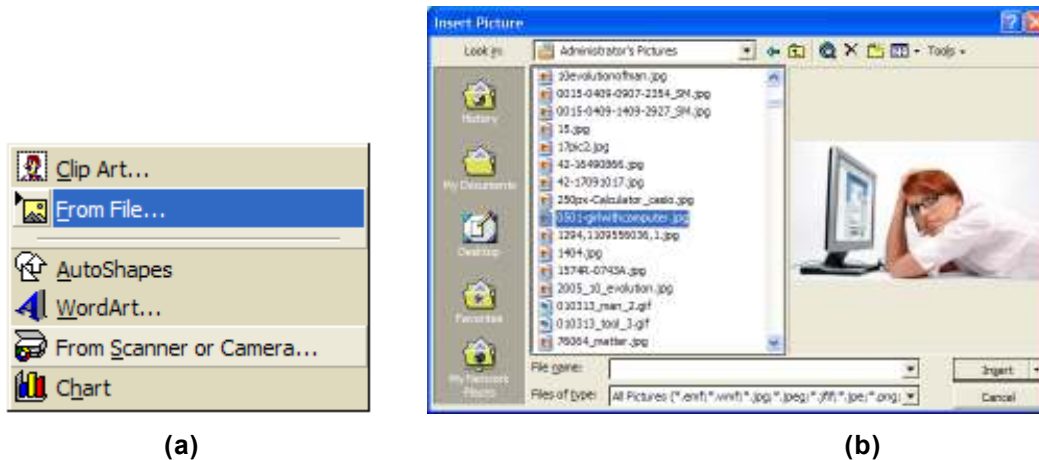
Perform following steps to merge two to more cells of the table:

1. Select the all those cells, which have to be merged together.
2. Select "Table" option from the bar menu. When you do so, Table submenu, as shown in figure 6.19(a) will appear on monitor screen.
3. Select "Merge Cells" option from Table submenu. When you do so, all selected cells will be merged together to form a single cells.

## Inserting Picture

Perform following steps to insert picture in the document:

1. Click the mouse at that place in the document, where the picture is to be inserted.
2. Select "Insert" option from the bar menu. When you do so, Insert submenu, as shown in figure 6.16 will appear on monitor screen.
3. Select "Picture" option from Insert submenu. When you do so, another submenu, as shown in figure 6.23(a) will appear on the screen.



**Figure 6.23**

4. Now select "From File..." option from this submenu. When you do so, a dialog box, as shown in figure 6.23(b) will appear on monitor screen.
5. Select desired picture through this dialog box.
6. At last, click the mouse on "Insert" button.

When you do so, selected picture will get inserted in the document.

## ACTIVATING ON-LINE SPELL CHECKER

On-line spell checker is a facility, using which the spelling of a word is checked, as soon as it is typed. If the spelling is found incorrect, the word is underlined with red zigzag line. If you wish, it could also suggest correct spellings for this word. Note that On-line spell checker marks incorrect spellings, only when it is made on. Perform following steps to switch it on:

1. Select "Tools" option from the Bar menu. When you do so, Tools submenu, as illustrated in figure 6.24 (a), gets displayed on the screen.
2. Select "Options" option from this submenu. When you do so, a dialog box, as illustrated in figure 6.24 (b), will appears on the screen. If somehow the options shown in the dialog box are different than those shown in the figure, click the mouse on "Spelling and Grammar" tab.
3. Check "Check Spellings as you type" check box.
4. Now select "OK" button.

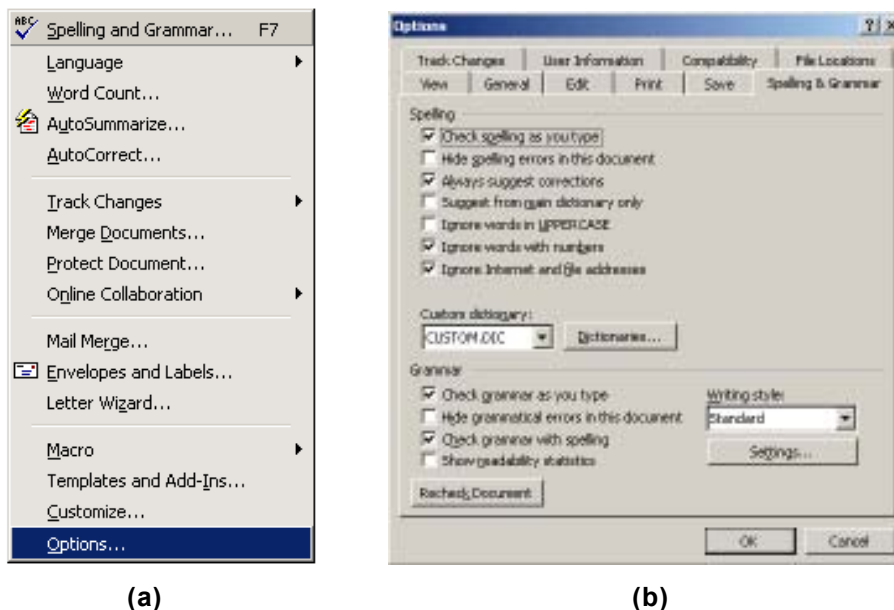


Figure 6.24

When you do so, On-line spell checker gets activated. Now, whenever you type a misspelled word, red colored zigzag line automatically underlines it.

## CORRECTING WRONG SPELLINGS

To correct the spelling, right click the mouse on wrong spelling. When you do so, a popup menu, containing the list of suggestions, appears on the screen. Correct spelling can be chosen from this list by clicking the mouse on appropriate suggestion.

## GRAMMAR CHECKER

MS-Word provides Grammar Checker facility, which can either be activated or deactivated as per requirements. When activated, green color zigzag line underlines all grammatically wrong sentences that have already been entered. After this, when next sentence is typed, grammar checker checks it immediately, on-line.

Grammar checker not only provides the facility to check grammatically wrong sentences but it also displays alternatives to correct them. How grammar checker is activated, how it is made use of is explained below.

Perform following steps to activate the grammar checker:

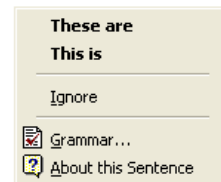
1. Select "Tools" option from the Bar menu. When you do so, Tools submenu, as illustrated in figure 6.24 (a) appears on the screen.
2. Select "Option" option from this submenu. When you do so, a dialog box, as illustrated in figure 6.24(b) will appear on the screen. If somehow, different options appear in the dialog box, click the mouse on "Spelling & Grammar" tab.
3. Now check "Check grammar as you type" check box.
4. Make sure that "Hide grammatical errors as you type" check box is unchecked.
5. At last click the mouse on "OK" button.

When you do so, Grammar checker will get activated and all grammatically wrong sentences will get, underlined by green color zigzag line.

## CORRECTING INCORRECT SENTENCES

As mentioned earlier, Grammar Checker utility of MS-Word, suggests, few suggestions for correcting grammatically wrong sentences. Perform following steps to make use of this facility:

1. Right click the mouse on grammatically wrong sentence. When you do so, a list of suggestions, as shown in figure 6.25, in the form of popup menu appears on the screen.
2. If the wish to accept a suggestion from the list, click the mouse on that suggestion. When you do so, suggested sentence will replace the incorrect sentence.
3. If you don't want to accept any suggestion from the list and wish to continue with original sentence, click the mouse on Ignore button.



**Figure 6.25**

In both the cases (mentioned above), you will return back to the document and green zigzag line will get removed.

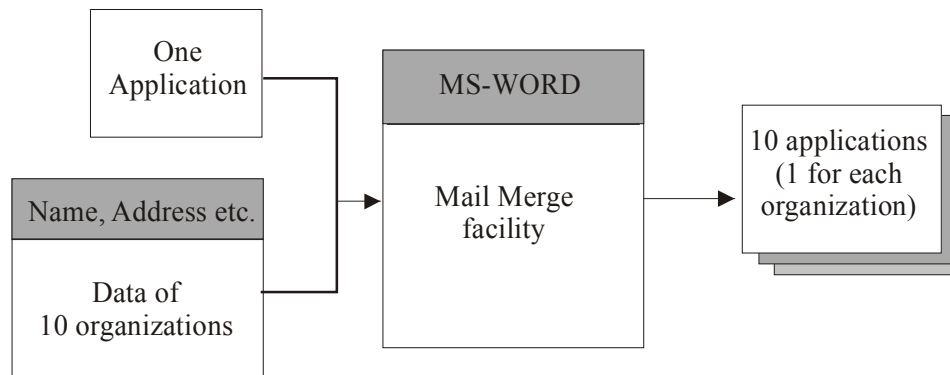
Using this procedure, all grammatically wrong sentences can be corrected.

## INTRODUCTION TO MAIL MERGE OPERATIONS

You are now familiar with the method of typing a letter in MS-Word and formatting it, so that it looks attractive. Now, say, you have to send applications to many organizations for seeking employment. But the question is, if the same letter has to be sent to say 10 or 15



organizations then what do you do? Do you copy the letter to 10 or 15 different files and change the names and addresses of organizations in individual files? No, this is not the right solution. If you are working in MS-Word, it provides a facility called Mail Merge. Using this facility, you can create two different files, one file containing data (i.e. names and addresses of all the organizations) and other containing application (with name and address left blank). After creation of these files, they are merged together, so that one letter is created for each individual. Concept of Mail Merge is illustrated in 6.26.



**Figure 6.26**

## TERMS AND TERMINOLOGY OF MAIL MERGE

Before we describe operational details of Mail Merge, it is necessary to get familiar with few important terms and their meanings.

### Main Document

Format of the letter, which is to be sent to each individual, is called main document. Refer figure 6.26 and note that application letter format is nothing but main document.

Main document basically consists of two items; one is the text that will appear in the letter (such as "This has reference to your advertisement in newspaper.....") and other are the variables, which will fetch the data (such as name, address etc. of friends) from the data file. How main document is created, is explained later in this chapter.

### Data Source

Data source is basically a combination of two items i.e. Header row and Data. Refer figure 6.26 and note that combination of item like name, address etc. and the data is nothing but data source.

### Header Row

Those items, related to which the data exists in the data file, constitute header row. For example, if the data in the data file relates to name, address and telephone number of the organizations then these three items put together will constitute header row. Following is an example of header row:

**Name, Add, Tel**

Here names (spellings) of all individual items of header row and their sequence in header row are important, wherever they will be referred, they will be referred by same name and the data in the data file will have to be put in the same sequence.

### Data

Data consists of those values, which are to be included in the letters. For example, if the letters are to be sent to 4 organizations then there will be 4 rows of data. Each row will contain values for each individual organization. Table shown here clearly illustrates header row and data.

Header Row	Name	Add	Tel
	Sun Infotech	1 Park street Mumbai	2787531
	Tech Art	23 Dover Lane Delhi	2608529
Data	Mastek	43 Mall Avenu Chennai	23405091
	Electro Magic	69 Broad Street Delhi	26589063

For generating letters through Mail Merge facility of MS-Word, you need to create main document, data source and data, first. After this, data is merged with the main document and letters are printed. Operational details for creating these items are given below.

### CREATING THE MAIN DOCUMENT

Perform following steps to create the main document:

1. Select "Tools" option from the bar menu. When you do so, Tools submenu, will appear on the screen.
2. Select "Mail Merge..." option from Tools submenu. On selecting this option, Mail Merge Helper screen, as shown in figure 6.27, will appear on the screen.
3. Click the mouse on "Create" button. When you do so, a drop down list, as shown in figure 6.28 will appear on the screen.
4. Select "Form Letters" option from this list. When you do so, a dialog box as shown in figure 6.29, will appear on the screen.
5. If you wish to create the document in current window, click the mouse on "Active Window" button else click it on "New Main Document" button. In both the cases, Mail Merge Helper screen, as shown in figure 6.30, will appear on the screen.



**Figure 6.27**

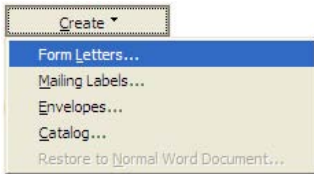


Figure 6.28

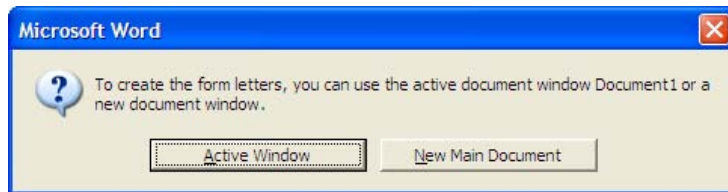


Figure 6.29

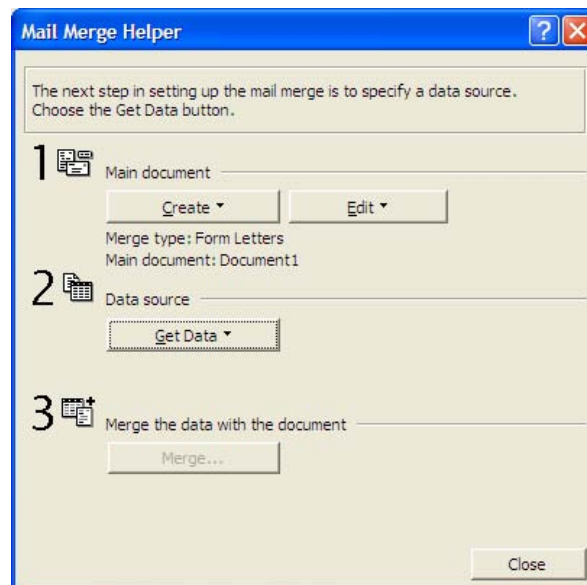


Figure 6.30

Note that main document consists of text and the field names (header row constituent). So in order to create the main document, you will have to write the text and the field names also. But the field names have not yet been created. So let's first create the data source and then create the main document.

## CREATING THE DATA SOURCE

Perform following steps to create the data source:

1. Click the mouse on "Get Data" button, present in "Mail Merge Helper" screen (figure 6.30). On selecting this option, a drop down list as shown in figure 6.31 will appear on the screen.
2. Since the Data Source is being created for the first time hence select "Create Data Source" option from this list. When you do so, a dialog box, as shown in figure 6.32, will appear on the screen.

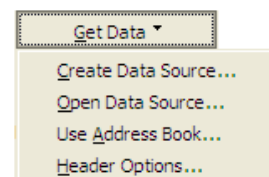
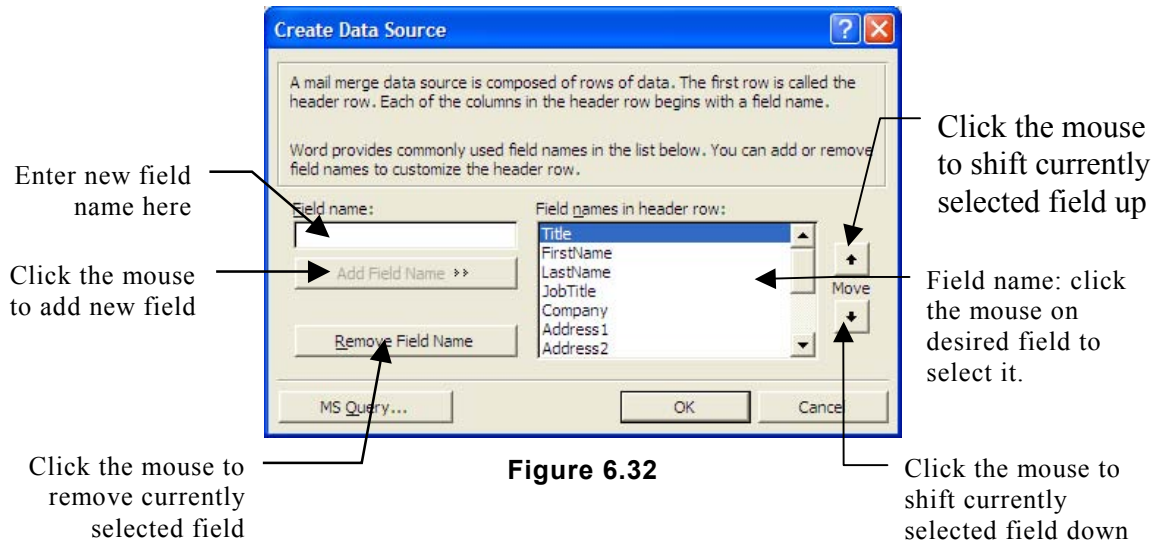


Figure 6.31



**Figure 6.32**

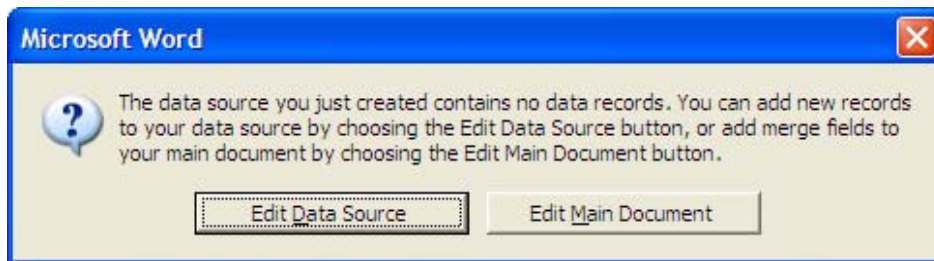
Using this dialog box, create the header row and data, as mentioned below.

### Creating Header Row

1. You know that header row consists of field names. Field names currently present in header row are shown in "Field names, in header row" list box. To remove any field from the header row, select the field and click mouse on "Remove field Name" button.
2. To add a new field in header row, enter the name in "Field name" text box and click the mouse on "Add Field Name" button.
3. To change the sequence of the fields in the header row, make use of arrow buttons. For example, say you create the header row with following field names:

**Name, Add, Tel**

4. Click the mouse on "OK" button. When you do so, usual "File Save" dialog box appears on the screen. Mention drive, folder and file name for saving the header row. Say for example, you specify the file name as "DataRow". To end the saving process, click the mouse on "Save" button. When you do so, a message box, as shown in figure 6.33, will appear on the screen.



**Figure 6.33**

## Creating The Data

1. To create the data, click the mouse on "Edit Data Source" button, present in the message box, shown in figure 6.33. When you do so, a data entry form, as shown in figure 6.34, will appear on the screen. This form will have provision for entering the data for all the fields of header row.
2. To enter the data, type the field values in the corresponding text boxes and click the mouse on "Add New" button. It will add a new record to the file and create blank screen for entering the next record.

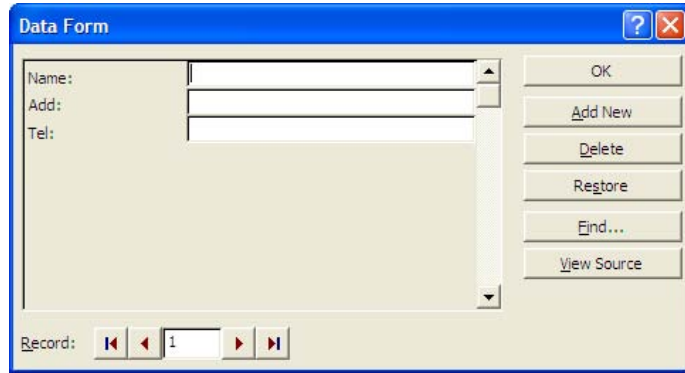


Figure 6.34

After entering the complete data, click the mouse on "OK" button. When you do so, Mail Merge toolbar, as shown in figure 6.35 will appear on the screen and you will be taken back to the main, blank document, which, you had created at the beginning. Now you need to enter the text and header row field names in the document so that letters for all individuals could be generated.

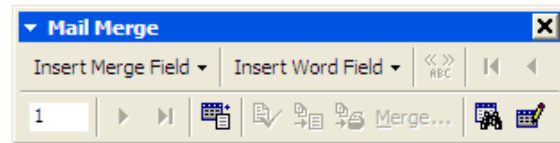


Figure 6.35

## EDITING THE MAIN DOCUMENT

Perform following steps to edit the main document:

1. Type the text of the letter, in normal way, as you type the contents of other documents
2. To add the header field name in the text, take the mouse pointer at the place, where the field is to be added and click the mouse on "Insert Merge Field" button, present in Mail Merge toolbar (Figure 6.35). When you do so, header row field name will get displayed, as shown in figure 6.36.
3. Select the field by clicking the mouse on it. When you select the field, MS-Word will put the field name at the current insertion pointer's position as, <<Name>>. Remember that these signs are not less than or greater than signs, they cannot be entered through keyboard. They can only be included through Mail Merge toolbar.

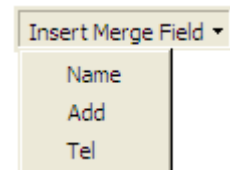


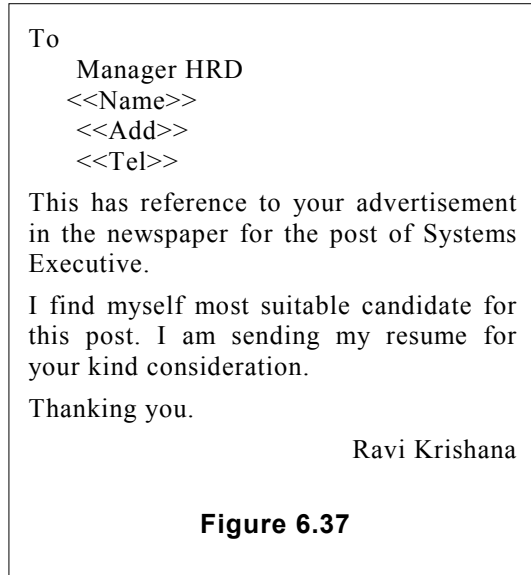
Figure 6.36

Say, for example, you prepare the main document, as shown in figure 6.37.

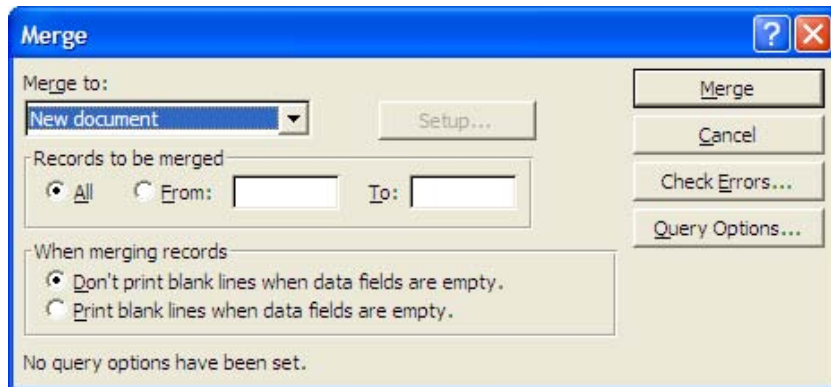
## MERGE DATA SOURCE WITH MAIN DOCUMENT

Perform following steps to merge the data with main document:

1. Make sure that main document file (For example, Invitaton.doc) is there on the screen.
2. Select "Tools" option from the bar menu. When you do so, Tools submenu will appear on the screen.
3. Select "Mail Merge" option from Tools submenu. When you do so, "Mail Merge Helper" screen, as shown in figure 6.30, will appear on the screen.
4. Click the mouse on "Merge" button present in that screen. When you do so, a dialog box, as shown in figure 6.38, will appear on the screen.
5. Using different objects of this dialog box specify printing related details.
6. At last, click the mouse on "Merge" button present in the dialog box.



When you do so, letters for all the persons, will get generated on the screen. If you wish, you can print them on printer in the same way as other document. Sample letters for the example, taken in this chapter are illustrated below.



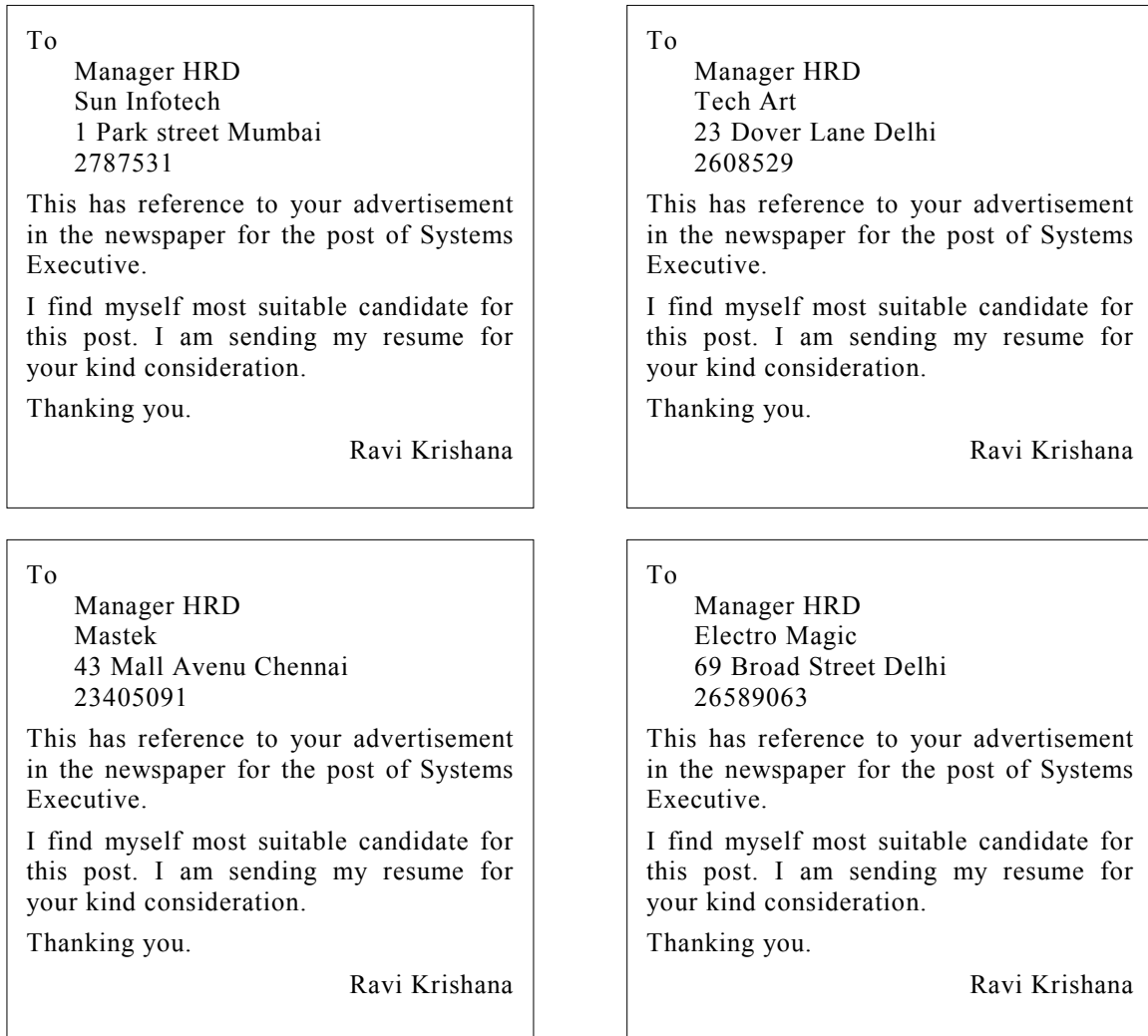


Figure 6.39

# PRACTICAL

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## ASSIGNMENT -1

Prepare a newsletter with borders, two columns text, header and footer and a graphic image and spell check the document.

- (i) Set left and right margins for the entire document (Procedure is given on page 148).
- (ii) Set two columns formatting for the page (Procedure is given on page 156).

- (iii) Type the following text in 11 points, Times New Roman, without caring about its formatting:

The Crossover

A new business opportunity is coming up at the junction of hardware and software embedded technology

An Indian boy selling newspapers at Stockholm railway station was unusual enough for Sunil to investigate. The boy turned out to be a student at the Royal Institute of Technology, Sweden. He talked excitedly about an idea for a pace marker that lasted much longer than the ones available in the market. "Why don't you come and develop this product in my laboratory?" asked Sunil.

The lab is a center of excellence for embedded systems at Tata Consultancy services (TCS) in Bangalore. Sunil had set it up only a year ago, after quitting Sasken Communication Systems. "I had approached TCS with this idea of an embedded systems lab and TCS had agreed," say Sunil. Despite being the largest software services company in India, TCS had not worked on embedded system other than in telecommunications. It was slow off the blocks, but the company was trying to make up for lost time.

Sunil's lab's mandate was not to provide services. It would to research, develop technologies, and build product; not just software but complete devices. Whenever a product came out, it would be sold under the TCS brand name. The first device could be patient health monitoring system. The next one could be a box that would increase spectrum utilisation in CDMA (code division multiple access) networks. The third device could be the boy's pacemaker.

- (iv) Now perform following steps to edit and format the text:
- Find the word utilisation in the document and replace it with utilization (Procedure is given on page 152).
  - Put the heading, "The Crossover" in 24 points bold, Arial Black (Procedure is given on page 153).
  - Put the border around "The Crossover" heading (Procedure is given on page 155).
  - Make the text, starting with the words "**A new business opportunity.....**" till "**embedded technology**" as subheading. Put them in 14 points bold, italic and underlined (Procedure is given on page 153).
  - Import the picture in the document (Procedure is given on page 160).
  - Align the paragraphs (Procedure is given on page 153).
  - Format the document, as shown below.
  - Save the document in a file.



*Technology News***The Crossover****A new business opportunity is coming up at the junction of hardware and software embedded technology**

An Indian boy selling newspapers at Stockholm railway station was unusual enough for Sunil to investigate. The boy turned out to be a student at the Royal Institute of Technology, Sweden. He talked excitedly about an idea for a pace marker that lasted much longer than the ones available in the market. "Why don't you come and develop this product in my laboratory?" asked Sunil.



The lab is a center of excellence for embedded systems at Tata Consultancy services (TCS) in Bangalore. Sunil had set it up only a year ago, after quitting Sasken Communication Systems. "I had approached TCS with this idea of an embedded systems lab and TCS had agreed," says Sunil. Despite being the largest software services company in India, TCS had not worked on embedded system other than in telecommunications. It was slow off the blocks, but the company was trying to make up for lost time.

Sunil's lab's mandate was not to provide services. It would to research, develop technologies, and build product; not just software but complete devices. Whenever a product came out, it would be sold under the TCS brand name. The first device could be patient health monitoring system. The next one could be a box that would increase spectrum utilisation in CDMA (code division multiple access) networks. The third device could be the boy's pacemaker.

Page 1

**ASSIGNMENT -2**

Creating a table to show the paradigm of the verb "eat" in all 12 tenses.

- (i) Create a table, consisting of 13 rows and 5 columns (Procedure is given on page 158).
- (ii) Select cells (2<sup>nd</sup> row, 1<sup>st</sup> column), (3,1) and (4,1) and merged them together (Procedure is given on page 160).
- (iii) Select cells (5,1), (6,1) and (7,1) and merged them together (Procedure is given on page 160).

- (iv) Select cells (8,1), (9,1) and (10,1) and merged them together (Procedure is given on page 160).
- (iv) Select cells (11,1), (12,1) and (13,1) and merged them together (Procedure is given on page 160).
- (v) Type the text in the table, as shown below.

Tense		Present	Past	Future
Simple	He	Eats	Ate	Will eat
	I	Eat	Ate	Will eat
	You/ They	Eat	Ate	Will eat
Continuous	He	Is eating	Was eating	Will be eating
	I	Am eating	Was eating	Will be eating
	You/ They	Are eating	Was eating	Will be eating
Perfect	He	Has eaten	Had eaten	Will have eaten
	I	Have eaten	Had eaten	Will have eaten
	You/ They	Have eaten	Had eaten	Will have eaten
Perfect Continuous	He	Has been eating	Had been eating	Will have been eating
	I	Have been eating	Had been eating	Will have been eating
	You/ They	Have been eating	Had been eating	Will have been eating

### ASSIGNMENT - 3

Prepare your Bio-data/Resume.

- (i) Set left and right margins for the entire document (Procedure is given on page 148).
- (ii) Type your details.
- (iii) Format the document.

### ASSIGNMENT - 4

- (i) Do the mail merge operation for sending applications to many companies with your resume.
  - Create the main document (i.e. application). Format of the application is shown in figure 6.37 and the procedure for creating the application is given on page 164.
  - Create the data source (i.e. field names and data). Details of data source are given on page 164 . Procedure for creating data source is on page 165.
  - Merge main document with data source to generate applications for many companies. Procedure for merging them is given on page 168.

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# Computer Application Laboratory

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## CHAPTER 7

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### *MS-Excel*

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#### INTRODUCTION

Data collection, its organization and presentation in easy-to understand forms like tables, graphs, charts etc. for the purpose of analysis are day-to-day activities of any working setup. For example, a sales organization, at the end of financial year, may collect sales figures from all its regional offices for analyzing company's sales performance and deciding the targets for the next year. Similarly a manufacturing organization may collect all input costs involved in manufacturing an item to estimate fund requirements and to calculate the profitability.

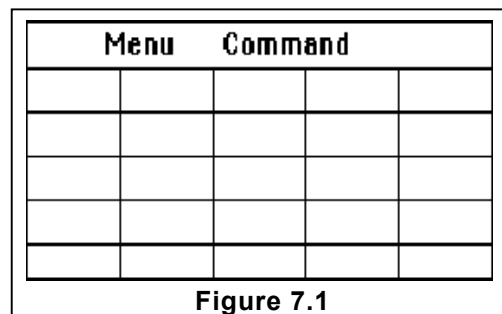
When data volumes are small, such activities are either performed manually or using equipments like calculator etc. But when data volume becomes large and presentation requirements are complex, these tools become limitation. Other sophisticated tools are required to handle such situations. MS-Excel is one such software-tool, which facilitates maintaining large data volumes on computer, organizing them in the form of tables, charts, reports etc. and performing "What if" analysis. Working details of MS-Excel are described in this chapter.

#### MS-EXCEL - A WORK BOOK

MS-Excel is workbook software, which has been designed and developed by Microsoft Corporation of USA.

Workbook software comprises of multiple worksheets with data editing facilities and inbuilt calculation abilities. Data editing facilities of workbook ensure proper organization of data and calculation abilities facilitate its automatic updation.

A simple worksheet is illustrated in figure 7.1. It looks like a page of child's mathematics copy that



Menu		Command		

Figure 7.1

has squares drawn in it. Squares are used for writing labels, data or formulae in them. When data pertaining to similar entities like organization, item, month, year etc. is put in same column or row, it automatically gets organized in the form of table. Such a table is illustrated in figure 7.2.

	A	B	C	D	E
1	<b>Sale in Lakhs</b>				
2		<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Total</b>
3	<b>Rubic</b>	5	7	11	
4	<b>Penta</b>	7	9	13	
5	<b>Nino</b>	2	6	17	
6	<b>Total</b>				

=SUM(B3:D3) (points to cell E3)  
 =SUM(B4:D4) (points to cell E4)  
 =SUM(B5:D5) (points to cell E5)  
 =SUM(E3:E5) (points to cell E6)  
 =SUM(B3:B5) (points to cell B6)  
 =SUM(C3:C5) (points to cell C6)  
 =SUM(D3:D5) (points to cell D6)

**Figure 7.2**

When formulae are defined in worksheet, automatic calculations are done and results are generated.

For example, if formulae are defined in the worksheet, shown in figure 7.2, as mentioned therein, the figures will be generated automatically, as shown in figure 7.3. If somehow any participating figure changes, all corresponding changes will be automatically done. For example, if sales figure of Nino company, for the month of Jan, changes from 2 to 5 then total figure for the month of Jan will change from 14 to 17. Total sales figure for Nino company will change from 25 to 28 and Total sales figure will change from 77 to 80.

	A	B	C	D	E
1	<b>Sale in Lakhs</b>				
2		<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Total</b>
3	<b>Rubic</b>	5	7	11	<b>23</b>
4	<b>Penta</b>	7	9	13	<b>29</b>
5	<b>Nino</b>	2	6	17	<b>25</b>
6	<b>Total</b>	<b>14</b>	<b>22</b>	<b>41</b>	<b>77</b>

**Figure 7.3**

Note that figure 7.2 or figure 7.3 illustrates a single worksheet. A workbook comprises of many such worksheets. An Excel workbook comprises of 255 such worksheets.

## OPENING A WORKSHEET AND ENTERING DATA

Perform following steps to invoke MS-Excel on your computer:

1. Click the mouse on "Start" button. When you do so, Start menu, as shown in figure 5.1 (a) will appear on the screen.
2. Select "All Programs" option from this menu. When you do so, a submenu, as shown in figure 5.1 (b) will appear on the screen.
3. Select "Microsoft Excel" option from this submenu.

When you do so, MS-Excel window, as shown in figure 7.4, will appear on the screen.

## INTRODUCTION TO MS-EXCEL WINDOW

Refer figure 7.4 and note that Excel window comprises of two nested windows. The outer window is called Application window and the inner windows is called Document window. Each window comprises of many components. A brief introduction of their components is given below.

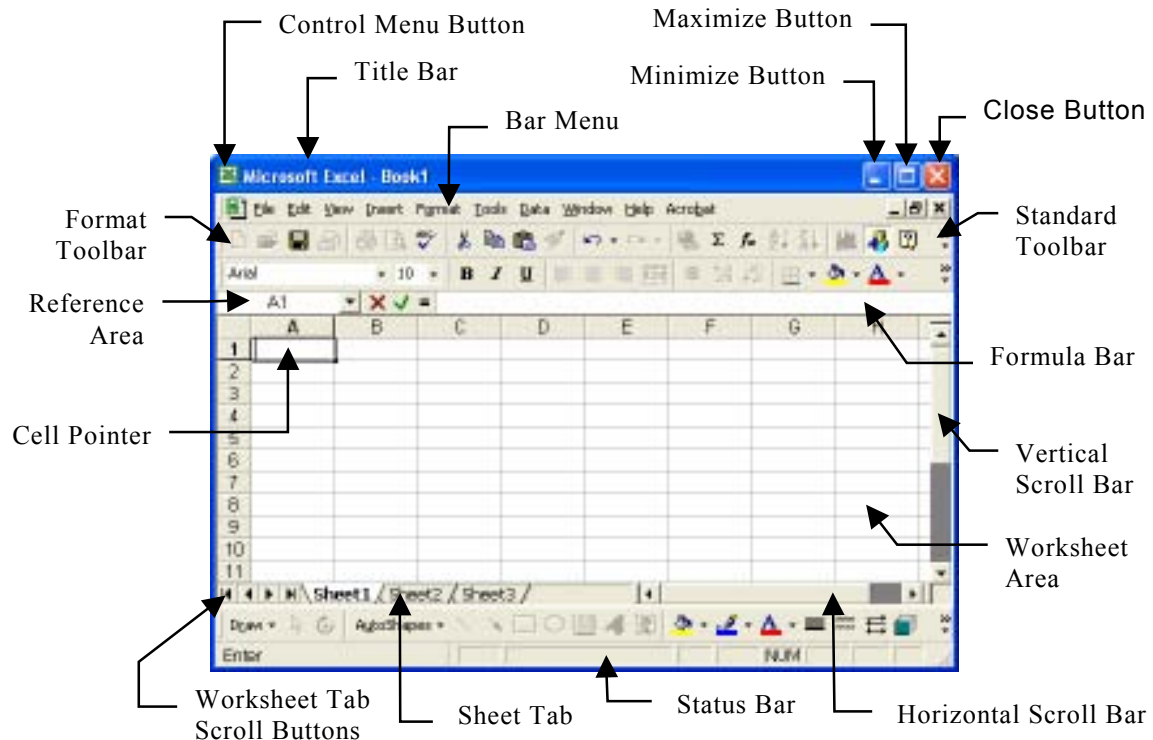


Figure 7.4

### Application Windows

Components of MS-Excel Application window are as follows:

#### Title Bar

Title bar comprises of usual components like system menu button, name of the current document, minimize, maximize and close button.

#### Status Bar

Status bar at the bottom of MS-Excel window comprises of message area and few buttons. Message area generally displays status of current activities. Buttons display the status of various action keys of the keyboard. For example, Num Lock is on or off, Caps Lock key is active or not etc. are few situations that are indicated by these buttons.

## **Document Window**

Document window comprises of few common components like bar menu, toolbars, scroll bar etc. and few special components, which are local to Excel window. You are already familiar with the role and functioning of all the common components. Role and functioning of all special components of MS-Excel window are explained below.

### **Formula Bar**

Formula bar is a place where you can enter the contents of the cell. Whenever you type something in it and press Enter key (or click the mouse on tick symbol) it gets written in the current cell.

### **Reference Area**

This is the place where the address of current cell gets displayed.

### **Drop Down List**

Drop down list is basically a list of all those items of the worksheet, which have been assigned a name. When mouse is clicked on the arrow button, names get displayed.

### **Formula Entry Area**

This is basically the text entry area. Whatever you type here is later transferred to current cell. All modifications in the cell entries are done in this area.

### **Tick Button**

It works like "Enter" key of the keyboard. When mouse is clicked on this button, contents of formula entry area get transferred to the current cell.

### **Cross Button**

Cross button works like "Cancel" button. When mouse is clicked on this button, contents of formula entry area get erased and that area becomes blank.

### **Equal To Sign Button**

When mouse is clicked on this button, function wizard appears on the screen and starts functioning.

## **Worksheet Area**

Worksheet area comprises of rows and columns. Partial area of the worksheet remains visible on the screen. Other portion of it can be brought on the screen by scrolling the worksheet, using vertical and horizontal scroll bars.

All together there are 65536 rows and 256 columns in a worksheet. Refer figure 7.4 and note that rows are labeled as 1,2,3,4,5 etc. and columns are labeled as A, B, C, D, E etc. Thus the last row will be labeled as 65536 and the last column will be labeled as IV

Intersection of a row and column forms a rectangular space, called Cell. Each cell is identified by its address and the address of the cell is defined as column number and the name of the row that form the cell. For example, the cell formed by fifth column (i.e. E)

and third row (i.e. 3) will be defined as E3. Similarly the cell formed by fourth column (i.e. D) and second row (i.e.2) will be defined as D2.

Worksheet area is used for data entry. As per standard rules of MS-Excel, contents of a cell are considered as single data item. In other words you can say that a cell of the worksheet can hold single data item only.

### Worksheet Tab

As mentioned earlier, a workbook comprises of 256 worksheets. Each worksheet has a corresponding tab in MS-Excel window. Refer figure 7.4 and note that these tabs are placed just below the worksheet area. These tabs are named as Sheet1, Sheet2, Sheet3 ... etc.

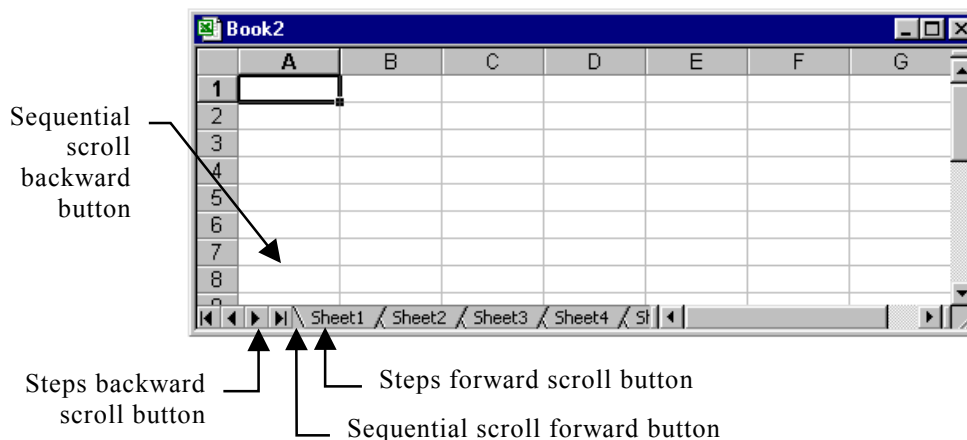
When you invoke MS-Excel, first worksheet appears in the window and Sheet1 tab remains highlighted.

### Worksheet Tab Scroll Buttons

Refer figure 7.4 and note that not all 255 worksheet tabs (as there are 256 worksheets in a workbook) remain visible on the screen. Due to space limitation, only few of them appear on the screen. To scroll the list of these tabs, worksheet tab scroll buttons remain present in the window.

Figure 7.5 clearly shows that there are four worksheet tab scroll buttons. Sequential scroll buttons scroll the tabs forward and backward one by one. For example, if currently Sheet3 is visible on screen and you click the mouse on "Sequential scroll forward" button, sheet4 tab will become visible. Similarly "Sequential scroll backward" button will move the tabs in backward direction.

Step scroll buttons, scroll the tabs in steps. For example, if tabs for sheet1, sheet2, sheet3 etc. are visible on the screen and you click the mouse on "Steps forward scroll" button, set of tab buttons i.e. Sheet4, sheet5, sheet6 etc. will be visible on the screen. Similarly "Step backward scroll" button will scroll the worksheet tabs in other direction.



**Figure 7.5**

## **Cell Pointer**

Refer figure 7.4 and note that the thick border around the cell (A1) is cell pointer. Cell pointer can be moved anywhere in the worksheet with the help of arrow keys of the keyboard. The cell, on which cell pointer resides, is referred to as current cell. When you enter the data, it gets entered in the current cell.

Now you are familiar with MS-Excel window, its components, worksheet and the workbook. Now the question is how do you move around in the worksheet or workbook? Well, the procedure for these activities is explained below.

## **MOVING AROUND IN A WORKBOOK**

You can move around in the workbook in any one of the following ways:

1. Make use of the arrow keys to move the cell pointer to the desired location. The position of cell pointer will be your current position in the worksheet.
2. Click the mouse on the cell, to which you wish to move. When you do so, cell pointer will get immediately placed there and the clicked cell will become current cell.
3. Click the mouse in Reference area of formula bar and type the address of the desired cell. After this, when you will press Enter key, cell pointer will move to the cell whose address you had typed in the reference area.
4. To move to any other worksheet, click the mouse of its sheet tab. For example, if you wish to move to the third worksheet, click the mouse on "Sheet3" tab, located just below the worksheet area. If the desired worksheet tab is not visible on the screen, make use of "Worksheet tab scroll" buttons, to make it appear there.

## **ENTERING DATA IN WORKSHEET**

Data entry in worksheet is quite different from the text entry that is done in MS-Word. In MS-word, you continuously keep on typing the text but in MS-Excel worksheet you need to type each data item in a separate cell. For example, if you wish to enter three data items, say Ravi, 200, 555 then you will have to type Ravi in one cell then move to other cell and type 200 there. Similarly for typing 555, you will have to move to some other desired cell and then type the number.

## **DATA TYPES**

The data that can be entered in MS-Excel worksheet is broadly classified into following two categories:

1. Constants
2. Formula

### **Constants**

The values, which do not change on their own are called constants, For example, if you enter "Ravi" in cell A1, it will not change unless you deliberately modify it (to say,



Ravina). Similarly other values like 200, 255 etc. will also be treated as constants because they will not change automatically.

## Type Of Constants

Constants can further be classified into following categories:

1. Numbers
2. Text
3. Date
4. Time

### Numbers

Any combination formed by ten digits i.e. 0 to 9 is treated as number or numeric constant. For example, 200 is a number. Similarly 555 is another number or another numeric constant. Use of following special characters is allowed in the formation of numbers:

**+ - ( ) / \* \$ %**

While making use of these special characters in the numbers, following rules apply:

1. MS-Excel ignores + sign in all the numbers that are preceded by it. For example, it will treat +176 as 176. Similarly +975 will be treated as 975.
2. Any number preceded by a hyphen (-) is treated as negative number. For example, -753 is a negative number.
3. \$ sign can precede the number. For example, \$200, \$735 etc. are valid numbers or valid numeric constants.
4. To increase the readability of the numbers, MS-Excel allows the use of comma in between the digits of the numbers. For example, 10,357, 1,567 etc. are valid numbers.
5. MS-Excel also accepts numbers in scientific notation. For example  $10e^6$ ,  $10e^3$  etc. are valid numbers in scientific notation.
7. Use of parenthesis is also allowed in forming the numbers. For example, (7), (200+700), (300-55) etc. are valid numbers.

### Text

Any data that is neither number nor date nor time, is treated as text in MS-Excel. For example, Ravi, Ravina, January, Month etc. are all examples of text. Note that a cell can hold at most 255 character long text. Blank is also treated as single character text.

### Date

MS-Excel allows date entries in the cells of the worksheet. It treats them as separate identities. Thus date mathematics becomes possible in MS-Excel. In date data, day, month and year values are either separated by hyphen (-) or slash (/). Following are few valid dates:

**22/06/1975, 16/MAY/1975, 10-3-1988 etc.**

## **Time**

Time is a valid data type in MS-Excel. For entering time values in MS-Excel worksheet, following rules apply:

1. Time values can either be as per 12 hours clock or 24 hours clock.
2. If time values are as per 12 hours clock, they should be followed by AM or PM. For example, 7 AM, 8 PM etc. are valid time values.
3. Instead of AM, PM, A and P can also be used respectively. For example, 7A, 8P are also valid time values.
4. If time value includes hours, minutes and seconds then colon (:) should be used as separator between them. For example, 10:45 AM, 1:10:05 PM etc. are valid time values.
5. Excel automatically displays time in 24 hours clock. For example, if you enter 2 PM, it will automatically convert it to 14:00.
6. Date and time values can be entered together in a cell by including a blank in between them. For example, 10/5/2006 11:55, 3/5/1957 10:20 PM etc. are few valid date and time entries.

## **Formula**

Formula is basically a user defined function, which can be formed as per our own requirements by making use of constants, mathematical operators, standard MS-Excel functions (there are numerous standard, predefined functions available in MS-Excel, for use), and cell addresses. For example,  $(A1*C1)+200$  is a valid formula. Similarly  $SUM(A1:A10)$  is another valid formula.

To differentiate formulae with text, all formulae should start with = sign in MS-Excel. For example, above mentioned formulae should be entered as  $=(A1*C1)+200$ ,  $=SUM(A1:A10)$  respectively.

### **Type Of Formulae**

MS-Excel formulae can be broadly classified into following categories:

1. Numeric Formulae
2. Logical Formulae
3. Text Formulae

A brief introduction of all these types of formulae is given below.

### **Numeric Formulae**

Formulae that make use of arithmetic operators are called Numeric Formulae. For example,  $=(A+B)-C1$  is a numeric formula because it makes use of arithmetic operator + and -. Following is the list of arithmetic operators that are allowed in MS-Excel.

Sign	Operations Performed
+	Addition
-	Subtraction (or negation when placed before a value, say - 149)
/	Division
*	Multiplication
%	Percentage (Placed after a value e.g. 25%)
^	Exponentiation (e.g. 20^2)

Following are few valid numeric formulae:

**=(A1+B1+C1+D1), =(B10-C10), =(A1\*B1)/C1, =(C1+C5)\*25%, (5^3)+B1**

### Logical Formulae

Formulae that make use of logical operators are called Logical Formulae. They are basically used for making logical comparison. The result of comparison is either TRUE or FALSE. They produce no other result. For example, =(A1>B1) is a logical formula because it makes use of logical operator >.

Following is the list of logical operators that are available in MS-Excel:

Sign	Meaning	Sign	Meaning
=	Equal to	>=	Greater than or equal to
>	Greater than	<=	Less than or equal to
<	Less than	<>	Not equal to

To get familiar with the use of logical operators and the result produced by logical formulae, assume that cell A1 contains 1000 and cell B1 contains 500. Formulae entered in different cells of the worksheet will generate result as summarized in the following table:

Cell	Formula	Result
C1	=(A1=B1)	FALSE
C2	=(A1>B1)	TRUE
C3	=(A1<>B1)	TRUE
C4	=(A1>=B1)	TRUE
C5	=(A1<B1)	FALSE
C6	=(A1<=B1)	FALSE

## Text Formulae

Those formulae, which make use of text operators, are called Text Formulae.

Only one text operator, called concatenation operator, is available in MS-Excel. It is denoted by & sign and it operates upon two text items to join them together. For example, if cell A1 contains "Andhra" and B1 contains "Pradesh" then =(A1&B1) will produce AndhraPradesh.

## ORDER OF EVALUATION

As per standard rules, evaluation of operators starts from right and gradually proceeds towards left. For example, formula =300-5+50\*3 will generate 445.

Making use of parenthesis can always change the order of evaluation. For example, formula=(300-5+50)\*3 will generate 1035.

Within the parenthesis, evaluation proceeds from right to left.

In case of nested brackets, innermost bracket is resolved first. After this, next outer bracket is resolved and evaluation proceeds in the same way. While evaluating an expression, operators are evaluated in following sequence:

Sr. No.	Operator	Description
1.	-	Negation (-25)
2.	%	Percent
3.	^	Exponentiation
4.	* and /	Multiplication and Division
5.	+ and -	Addition and Subtraction
6.	&	Text joining
7.	=, <, >, <>	Comparison operators

## DEFAULT FORMATTING

While entering the data in worksheet, it gets automatically formatted. The rules for default formatting are as follows:

1. Numeric values get right aligned.
2. Text values get left aligned.
3. Date and time values get right aligned.
4. Formulae get left aligned.

	A	B	C	D
1	125.6	Ajit	03/05/1976	9:45:17
2				

**Figure 7.6**

Default alignments of all these data items is shown in figure 7.6

## ENTERING AND EDITING FORMULA

You are now familiar with MS-Excel worksheet and the types of data that can be entered in it. To get familiar with the process of preparing a worksheet, let's take a simple example. Say, we have to prepare a worksheet, in which rate and quantity are entered manually and the amount is calculated automatically, using the formula (rate \* quantity).

Perform following steps for preparing this worksheet.

1. Type "Rate" in cell A1. The word, Rate is a text constant and will be treated as label or heading. Its purpose is to communicate that the value written below is rate.
2. Type the word "Quantity" in cell B1. This label will also serve the purpose of heading.
3. Type the word "Amount" in cell C1. This text will also serve the purpose of heading.
4. Since quantity and rate values have to be entered in cell A2, B2 respectively and the amount is to be calculated by multiplying values in these cells and the result is to be displayed (automatically) in cell C2 hence enter the formula, =(A2\*B2) in cell C2.
5. Now, when you enter the values in cell A2 and B2, result will get automatically displayed in cell C2. For example, if you enter 50 in cell A2 and 3 in cell B2 then the result, 150 (i.e. 50\*30) will automatically appear in cell C2.

Now, if you change the values either in A2 or B2 or in both the cell, value in cell C2 will automatically update itself, according to the formula. For example, if you change the value in cell B2, from 3 to 5, the value in cell C2 will change from 150 to 250. This worksheet is illustrated in 7.7.

	A	B	C
1	Rate	Quantity	Amount
2	50	3	150
3			

**Figure 7.7**

The formula that you enter in a cell can either be edited in cell, by double clicking the mouse in the cell and changing the contents there or by placing the cell pointer on the cell and editing the contents in the Formula Bar.

## REFERENCING A GROUP OF CELLS

Refer above mentioned example and recall that in cell C1, we made use of the formula, =(A2\*B2), Note that this formula makes use of the cell addresses, which refer single cell. For example, A2 refers a single cell. Similarly B2 refers other cell. But there would be times when group of cells will participate in the formula. For example, column A may contain 12 different sales values i.e. A1 may contain sales value for the month of Jan, A2 may contain sales value for the month of Feb and so on. Thus to add all the 12 values, you will have to write a formula =(A1+A2+A3 +----+A12). This is lengthy and uncomfortable way. To make the task simple, MS-Excel provides many reference operators. Using these operators, you can refer group of cells (more then one cell) and make the formula short. An explanation of these operators is given below.

## Range Operator

As the name indicates, Range operator, refers a group of cells, which fall within the given cell addresses.

Range operator is denoted by colon sign (:). It requires two operands and is used as Op1:Op2. Here Op1 is the first operand, which refers the address of the cell from where the range starts. Similarly Op2 is the second operand, which refers the address of the cell, where the range ends. For example, (A1:A12) will signify all the cells starting from cell A1 to cell A12 (i.e.12 cells). Similarly (A5:G5) will signify all the cell from A5 to cell G5 (i.e. 7 cells).

## Union Operator

As the name indicates, Union operator refers to all those cells, which are referred in the expression.

Union operator is denoted by a comma (.). It requires two operands and is used as op1, op2. Here op1 refers a cell address and op2 refers to another cell address. Thus (A7, B10) will refer two cells i.e. A7 and B10. Similarly (A7, A9, A11) will refer three cells A7, A9 and A11. In the same way (A5:A10), (B15:B20) will refer 12 cells i.e. all the cells starting from A5 to A10 (6 cells) and the cells starting from B15 to B20 (another 6 cells).

## Intersection Operator

Intersection operator refers to all those cells, which are common between the two given ranges.

Intersection operator is denoted by a blank space. It requires two ranges as operands and is used as (R1 R2). Here R1 and R2 are two ranges. For example, (A1:A10 A7:A15) will result into 4 cells i.e. A7, A8, A9 and A10.

## CELL REFERENCING

Consider the use of cell addresses in a formula. For example, in the worksheet shown in figure 7.7, the formula = (A2\*B2) was written. Here by writing A2 or B2, You are referring to the values present in these cells. When you refer the contents of the cell, it is called cell referencing. Note that just writing the cell addresses and referring their values is not the only way of cell referencing. MS-Excel provides following three methods of cell referencing:

1. Relative referencing
2. Absolute referencing
3. Mixed referencing

## Relative Referencing

As the name indicates, in relative referencing, cells are referred in relation to the current cell position. To understand the concept of relative referencing, consider the worksheet shown in figure 7.8. If you put the formula =(B2+C2+D2) in G2, it will show 1000 in G2. But it would, in the background, convey following aspects related to the current cell position (i.e. G2):

1. Take the value of the cell, which is 5 cells away towards left, from current cell.
2. Take the value of the cell, which is 4 cells away towards left, from the current cell.
3. Take the value of the cell, which is 3 cells away towards left, from the current cell.
4. Add all the three values and put the result in the current cell.

	A	B	C	D	E	F	G	H
1	Name	Jan	Feb	Mar			Total	Tax
2	LG	200	300	500				
3	BP	300	700	200				
4	RK	400	300	100				
5								
6	Tax Rate	0.1						

Figure 7.8

In MS-Excel, whenever cell addresses are written in normal way (i.e. A1, C2, D7 etc.), relative referencing automatically takes place.

### Note

Since in relative referencing all cell positions are referred in relation to current cell position, hence the same formula, when copied into another cell, (which would then be the current cell) will refer other cells and produce different result.

## Absolute Referencing

As the name indicates, in Absolute Referencing the position of the cell or cells being referred does not depend upon the current cell position. Such type of referencing is done by prefixing \$ sign with row and column names in a cell address.

For example, \$B\$2, \$C\$3, \$D\$4 etc. are examples of relative referencing. Note that B6 is an example of relative referencing, while \$B\$6 is an example of absolute referencing.

To understand the concept of relative referencing, consider the worksheet shown in figure 7.8 and assume that values in G2, G3 and G4 are to be multiplied by fixed value of tax rate, present in cell B6. For this, formulae as mentioned in the table will have to be entered in the cells, mentioned therein.

Cell	Formula
H2	=G2*\$B\$6
H3	=G3*\$B\$6
H4	=G4*\$B\$6

### Note

Since in absolute referencing, the position of the cell being referred does not depend upon the current cell position hence when a formula containing absolute referencing (only) is copied to other cell, it produces same result.

## Mixed Referencing

As the name indicates, in Mixed Referencing, the cell addresses are partly relative and

partly absolute. This is done by either prefixing a \$ sign with row name or column name. For example, \$B4, B\$4 both are examples of mixed referencing (but with a difference). In \$B4, column reference is absolute but row reference is relative, while in B\$4, it is just opposite i.e. column reference is relative and row reference is absolute.

### Note

Since in mixed referencing, the position of cell being referred, partially depends upon the position of the current cell and partially doesn't depend upon it hence a formula, which contains mixed references, when copied to other cell may or may not produce the same result, depending upon where the formula is copied.

## PREPARING A WORKSHEET

To get familiar with different types of referencing methods, let's prepare a worksheet, which is illustrated in figure 7.8. Say we have to enter labels and data, as shown therein.

Assume that row totals have to be calculated and put in corresponding cells of column G. Tax values have to be calculated by multiplying total by tax rate (present in B6). For this, perform following steps:

1. Enter all the labels, as illustrated in figure 7.8.
2. Enter all the data items, as illustrated in figure 7.8.
3. Enter formula,  $= (B2+C2+D2)$  in G2
4. Enter formula,  $= (B3+C3+D3)$  in G3
5. Enter formula,  $= (B4+C4+D4)$  in G4
6. Enter formula,  $= (G2*\$B\$6)$  in H2
7. Enter formula,  $= (G3*\$B\$6)$  in H3
8. Enter formula,  $= (G4*\$B46)$  in H4

	A	B	C	D	E	F	G	H
1	Name	Jan	Feb	Mar			Total	Tax
2	LG	300	300	500			1000	100
3	BP	300	700	200			1200	120
4	RK	400	300	100			800	80
5								
6	Tax Rate	0.1						

Figure 7.9

After entering these formulae, the worksheet will show the values, as illustrated in figure 7.9.

## SAVING THE WORKBOOK

Perform following steps to save the workbook on the disk:

1. Click the mouse on "File" option, present in the bar menu. When you do so, File submenu, as shown in figure 7.10, will appear on the screen.
2. Select "Save As" option from the File submenu. When you do so, a dialog box, as shown in figure 5.7 will appear on the screen.
3. Now select drive and the folder, in which you wish to save the worksheet.
4. Enter the name of the file, in which you wish to save the workbook in "File Name" text box.

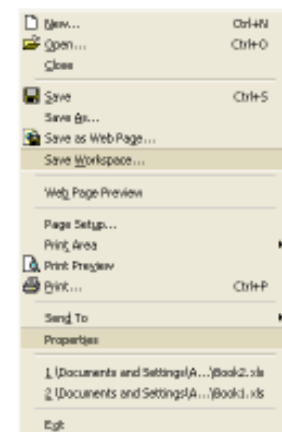


Figure 7.10



5. At last, click the mouse on "Save" button, present in the dialog box.

When you do so, file will get saved on the disk.

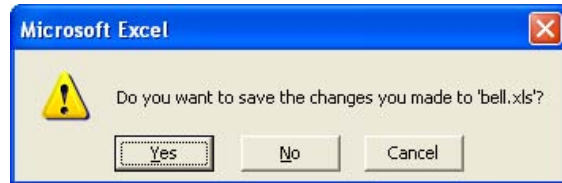
### **Note**

When you save a workbook, it is saved in a file that has the name, assigned by you. But MS-Excel assigns .XLS extension to it. For example, if you save the workbook in a file named, mywork, it will be saved in a file mywork.xls.

## **CLOSING THE WORKBOOK**

Perform following steps to close the workbook:

1. Click the mouse on "File" option, present in the Bar menu. When you do so, File submenu, as shown in figure 7.10 will appear on the screen.
2. Select "Close" option from File submenu. If current modifications have not yet been saved on the disk, an alert box, as shown in figure 7.11, will appear on the screen.



**Figure 7.11**

- On the other hand, if current modifications have been saved on the disk, the workbook will get closed.
3. If you wish to save the current editing session on the disk, click the mouse on "Yes" button else click it on "No" button. If somehow you wish to abort the closing process, click the mouse on "Cancel" button.

## **EXITING FROM EXCEL**

Exit from Excel can be made in any one of the following ways:

1. Select "Exit" option from the File submenu.
2. Select "Close" option from the System menu.
3. Click the mouse on "Close" button, present in title bar.

## **OPENING AN EXISTING WORKBOOK**

Perform following steps to open an existing workbook:

1. Select "File" option from the Bar menu. When you do so, File submenu, as shown in figure 7.10, will appear on the screen.
2. Select "Open" option from File submenu. When you do so, a dialog box, as shown in figure 6.4 will appear on the screen.
3. Select the drive, folder and the file, in which the workbook exists.
4. At last, click the mouse on "Open" button.

## PREPARING WORKSHEET WITH SERIES

MS-Excel provides various mechanisms for generating following types of series:

1. Arithmetic Progression series (1, 2, 3, 4, 5 .... etc.)
2. Geometric Progressing series (3, 9, 24, 81 ..... etc.)
3. Full month name series (January, February, March .... etc.)
4. Short month name series (Jan, Feb, Mar ..... etc.)
5. Full day name series (Sunday, Monday ..... etc.)
6. Short day name series (Sun, Mon, Tue ..... etc.)
7. Date series (1/1/2006, 1/2/2006 ..... etc.)

Methods of generating, such types of series are explained below:

### Generating AP Or GP Series

AP or GP type of series can be generated as follows:

1. Enter starting values in the cell and press Enter key.
2. Now select all those cells, which have to be filled with the series (including the one, in which you have entered the value), by dragging the mouse over them.
3. Now click the mouse on "Edit" option, present in bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
4. Select "Fill" option from this submenu. When you do so, another submenu, as shown in figure 7.12(b), will appear on the screen.

Now select "Series" option from this submenu. When you do so, a dialog box, as shown in figure, 7.12(c) will appear on the screen.

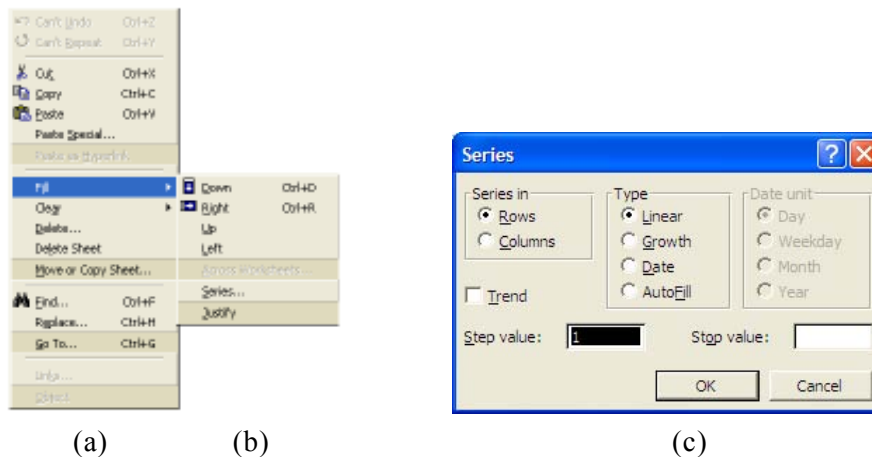


Figure 7.12

6. If you wish to generate AP series, select "linear" option and for generating GP series, select "Growth" option.

7. Enter suitable value for increment, in "Step value" edit box.
8. At last, click the mouse on "OK" button.

When you do so, series will get generated.

## Generating Day or Date Series

Perform following steps to generate the series of day name, month name etc.:

1. Enter the first term of the series in a cell and press Enter key. Say you enter Sun in cell D4.
2. Now click the mouse in the cell, in which you had entered the value. Thus you will have to click the mouse in D4 cell.
3. Now drag the mouse by handle, in any desired direction, (i.e. right, left, up, or down) over as many cells as there have to be terms in the series. Say you drag the mouse over 4 cells.

	A	B	C	D	E	F	G	H
1				Thu				
2				Fri				
3				Sat				
4	Thu	Fri	Sat	Sun	Mon	Tue	Wed	
5				Mon				
6				Tue				
7				Wed				
8								

Figure 7.13

When you do so, a series of short day names will get generated, as shown in figure 7.13.

### NOTE

Similarly, by entering January, Sunday etc. as first term of the series, you can generate month full-name, day full-name series etc.

## EDITING CELLS

Once a worksheet is prepared, it may require some editing. Contents of few cells may have to be copied from one place to other or deleted from the worksheet. The procedures for all such operations are described below.

### Selecting The Cells

For operating upon a cell or group of cells, you have to first select them. They can be selected by performing following actions:

1. To select a cell, click the mouse in the cell. When you do so, a thick border, with a handle at its right bottom corner, appears around the cell.
2. To select a range of cells, drag the mouse over the range. A selected cell range is shown in Figure 7.14.
3. To select the entire column, click the mouse on column name. For example, clicking the mouse on A will select the entire, first column.
4. To select a group of contiguous columns (say E, F, G and H) drag the mouse on their column names.

	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			
9			

Figure 7.14

5. Another method of selecting contiguous group of columns (say E, F, G and H) is to press shift key of the keyboard, click the mouse on first column of the group (i.e. E in this case) and then click it on last column of the group (i.e. H in this case, with shift key pressed).
6. To select a non contiguous group of columns (say A, C, D and I), keep CTRL key of the keyboard, pressed and click the mouse on name of each column, which is to be selected (i.e. A, C, D and I in this case.)
7. To select the entire row (say fifth row), click the mouse on row name (5 in this case)
8. To select the contiguous or non-contiguous group of rows, perform all the steps, mentioned above but instead of clicking the mouse on column names, click the mouse on row names.
9. To select the complete worksheet click the mouse on blank cell, which remains present towards left of column label A and just above row label 1.

### **Changing The Contents Of Cell**

Contents of a cell can either be edited in Formula Bar or within the cell itself. Both the procedures are given below:

1. To modify the contents in Formula Bar, click the mouse in the cell, whose contents have to be modified. When you do so, cell contents will appear in the Formula Bar. Now using DEL or Backspace keys etc. you can modify the contents. At last, press Enter key.
2. To modify the contents, within the cell, double click the mouse in that cell, whose contents have to be modified. When you do so, insertion pointer will appear in cell. Now using different keys of the keyboard, modify the contents, within the cell. At last press Enter key.

### **Copying The Contents Of The Cell**

Contents of a cell or group of cells can always be copied from their original place to another location of the worksheet. For this, perform following steps:

1. Select the cell or group of cells, which is to be copied.
2. Click the mouse on "Edit" option, present in bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
3. Select "Copy" option from Edit submenu. When you do so, a moving frame will surround the selected cells, indicating that this portion of the worksheet will get copied.
4. Now click the mouse on the cell (or the first cell of the range), where the contents have to be copied.
5. Click the mouse on "Edit" option of the bar menu again and get Edit submenu on the screen.
6. Select "Paste" option from Edit submenu.

When you do so, contents of selected range will get copied at current location.

Note that if you are copying labels or data from one place to another, they will get copied as such, without any modifications done (internally). But if you copy the formula or formulae, they may get copied with some modifications or without modifications, depending upon the types of cell references (relative, absolute or mixed) used in the formulae. To understand the concept, let's consider following three cases of copying the formula:

### **Copying Formula, Containing Relative References**

To understand the concept of relative referencing more clearly and observing its changing behavior in the event of copying the formula, perform following steps:

1. Enter three different values in cell A1, B1 and C1. Say you enter 100, 200 and 300 respectively in them.
2. Now enter the formula  $=A1+B1+C1$  in cell D1. When you do so, the value 600 will get displayed in the cell D1
3. Now copy this formula, in cell D1, to another cell, say E1. When you do so, to your surprise, the result will not be 600 (as the same formula produce 600 in D1). It will be 1100.

Take a look in the Formula Bar and you will find that the formula  $=A1+B1+C1$  has been copied as  $=B1+C1+D1$  (which will correctly produce 1100). The reason for this change is explained below.

Note that A1, B1 and C1 are relative references. The formula  $= A1+B1+C1$  in cell D1 indicates that values in the third left cell second left and first left cell have to be added together and the sum has to be put in the current cell. Now if this formula is copied in cell E1, then it would mean the same thing. Thus for this cell the participating cells will be B1 (third left cell that has 200 in it), C1 (second left cell, which has 300 in it) and D1 (first left cell, which has 600 in it). Thus the sum of these three cells will result into 1100.

### **Copying Formula Containing Absolute References**

To understand the concept of absolute referencing more clearly and observing its behavior in the event of copying the formula, perform following steps:

1. Enter three different values in three different cells. Say you enter 100, 200 and 300 in cells A1, B1 and C1 respectively.
2. Now enter the formula  $=(\$A\$1, \$B\$1, \$C\$1)$  in cell D1. When you do so, the value 600 will get displayed in it.
3. Now copy this formula, in cell D1, into another cell E1. When you do so, the same value, 600 will get displayed in cell E1.

Take a look in the Formula Bar and you will notice that formula has been copied as  $=\$A\$1+\$B\$1+\$C\$1$ . This time there is no change in the formula. This is because all these references (like  $\$A\$1$ ,  $\$B\$1$  etc.) are absolute references. They do not depend upon the current location. They directly point to cell, in question.

### **Copying Formula Containing Mixed References**

To understand the concept of Mixed References, more clearly and observing its behavior, while copying the formula from one cell to another, perform following steps:

1. Enter three different values in three different cells. Say you enter 100, 200 and 300 in cells A1, B1 and C1 respectively.
2. Now enter the formula = A\$1+\$B1+C\$1 in cell D1. When you do so, the value 600 will get displayed in it.
3. Now copy the formula in cell D1, into cell E1. When you do so, the value 1000 will get displayed in it.

Take a look in the Formula Bar and you will notice that the formula has been copied as B\$1+\$B1+D\$1. This is because in cell reference A\$1, column is relative reference and row is fixed reference. Due to this when you copy the formula, relative part (i.e. column) changes but row part remains same. Thus A\$1 gets copied as B\$1. Same thing happens while copying C\$1. Thus it gets copied as D\$1.

On the other hand something different happens when \$B1 gets copied. Note that in this cell reference, row reference is absolute (it will not change and column reference is relative). Since the cell reference is being copied in same row hence the row reference doesn't change (in this case). Thus \$B1 gets copied as \$B1.

The complete formula gets copied as =B\$1+\$B1+D\$1. Note that here cell B1, containing 200 is participating twice and cell D1 contains 600. Thus the formula produces 1000.

Now let's consider another case, say formula in D1 is now copied to cell D2. In this case the formula will get copied as =A\$1+\$B2+c\$1. Since A1 contains 100, B2 contains 0 and C1 contains 300. Hence value 400 will get displayed in D2.

### **Moving The Contents Of A Cell**

To move the contents, using bar menu, follow all the steps that have been described for copying but choose "Cut" option instead of "Copy" option.

### **Deleting The Contents Of The Cell**

Perform following steps to delete the contents present in the cell:

1. Select the cell or range of the cells, from which the contents have to be removed.
2. Select "Edit" option from bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
3. Now select "Clear" option from this submenu. When you do so, another submenu will appear on the screen.
4. Select "Contents" option from this submenu.

When you do so, the contents of the selected cell or cells will get erased.

## Undo The Changes

Perform following steps to cancel the effect of previous command:

1. Click the mouse on "Edit" option present in bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
2. Select "Undo" option from Edit submenu.

When you do so, the effect of previous command will get cancelled and the worksheet will retain the status, as it had before executing the previous command.

### Note

Previous command can be repeated, either by selecting "Redo" option from the Edit submenu or by clicking the mouse on "Redo" button present in Standard toolbar.

## Finding And Replacing The Contents In The Worksheet

Given content can be searched in the worksheet for its presence and if the need be, it could also be replaced by other content. For example, the presence of the word, **Bonus** can be searched in the worksheet and if required, it could be replaced by other word, say, **Incentive**.

Find and Replace are two different facilities of MS-Excel, available in Edit submenu. Replace facility is extension of Find facility and is executed in the same way as Find facility is done. The procedure for finding the given contents and replacing it by other contents is given below.

1. Select "Edit" option from the bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
2. Select "Replace" option from Edit submenu. When you do so, a dialog box, as shown in figure 7.15 will appear on the screen.
3. Enter the contents to be searched, in "Find what" text box. For example, if you wish to search the word, Bonus in the worksheet, type this word in "Find what" text box.
4. Type the word, with which the word being searched is to be replaced, in "Replace with" text box. For example, if the word Bonus is to be replaced with Incentive, type Incentive in "Replace with" text box.
5. Specify the direction of search by selecting either "By Rows" option or "By columns" option from "Search" dropdown list.
6. To make the search, case sensitive, check "Match case" check box.
7. To start the process, click the mouse on "Find Next" button. When you do so, MS-Excel will search the given contents (Bonus in above mentioned example) and halt the search temporarily, if it finds a match.



**Figure 7.15**

8. To replace the searched occurrence, with the given word, click the mouse on "Replace" button.
9. If you wish to replace all the occurrences of the given word with another word, in one shot, click the mouse on "Replace All" button.
10. At last, click the mouse on "Close" button.

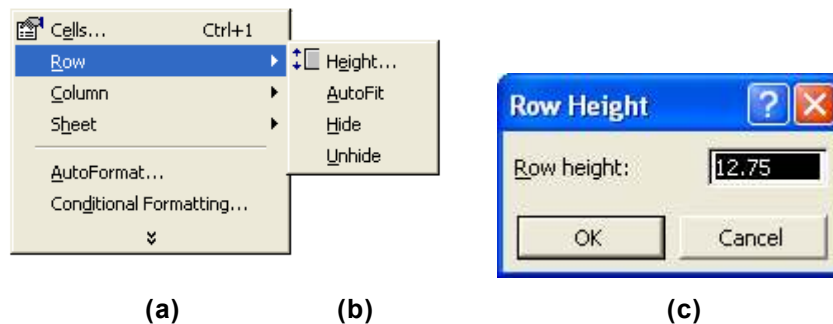
## MANIPULATING THE WORKSHEET

Operations like changing the height and width of rows and columns, inserting new rows and columns etc. are the operation, which are frequently required, while preparing a worksheet. Operational details of these activities are given below.

### Changing Height Of The Row

Perform following steps to alter the height of the row, so that bigger font characters could be accommodated in it:

1. Select the row or group of rows, for which the height has to be changed.
2. Select "Format" option from the bar menu. When you do so, Format submenu, as shown in figure 7.16(a), will appear on the screen.



**Figure 7.16**

3. Select "Row" option from Format submenu. When you do so, another submenu, as shown in figure 7.16(b), will appear on the screen.
4. Select "Height" option from this submenu. When you do so, a dialog box, as shown in figure 7.16(c) will appear on the screen.
5. Now enter the desired height in "Row height" text box, of this dialog box.
6. At last, click the mouse on "OK" button.

When you do so, the height of selected rows will change.

### Changing The Width Of The Column

The procedure for changing the width of the column is same as that of changing the height of the row (mentioned above), except that you need to select "Column" option from the



Format submenu (figure 7.16(a)) and "width" option from the submenu that appears thereafter.

## Inserting Blank Row Or Column

Perform following steps to insert blank row or column in the worksheet:

1. Place the cell pointer on the row (or column), above (or left) which the blank row (or column) is to be inserted.
2. Click the mouse on "Insert" option present in the bar menu. When you do so, a submenu, as shown in figure 7.17, will appear on the screen.
3. Select "Rows (or columns)" option from Insert submenu.

When you do so, a new blank row (or column) will get inserted just above (or towards left of) the current row (column).

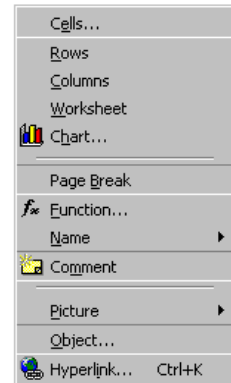


Figure 7.17

## Deleting Row Or Column

Perform following steps to delete unwanted row(s) or column(s) in the worksheet:

1. Select the row(s) or column(s) that need to be deleted.
2. Click the mouse on "Edit" option of the bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
3. Select "Delete" option from Edit submenu. When you do so, a dialog box, as shown in figure 7.18 will appear on the screen.
4. Select "Entire row" (or entire column) option from this dialog box.
5. At last, click the mouse on "OK" button.

When you do so, selected row (or column) will get removed from the worksheet.

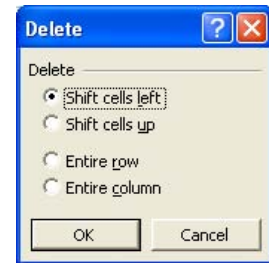


Figure 7.18

## Inserting A New Blank Worksheet

Perform following steps to insert a new blank worksheet in the workbook:

1. Click the mouse on that tab of the worksheet, left to which a new blank worksheet is to be inserted. For example, if a new worksheet is to be inserted in between Sheet4 and Sheet5, click the mouse on Sheet5 tab.
2. Select "Insert" option from the Bar menu. When you do so, Insert submenu, as shown in figure 7.17 will appear on the screen.
3. Select "Worksheet" option from Insert submenu.

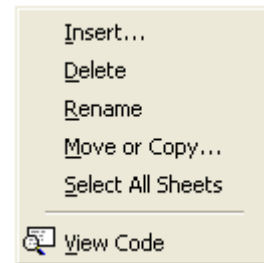
When you do so, a blank worksheet will get inserted in the workbook.

## Renaming The Worksheet

Recall that the worksheets of the workbook are named as Sheet1, Sheet2, Sheet3 etc. Perform following steps to rename any worksheet:

1. Right click the mouse on that name (sheet tab), which is to be changed. For example, if fifth worksheet is to be renamed, click the mouse on the tab named Sheet5. When you do so, a popup menu, as shown in figure 7.19 will appear on the screen.
2. Select "Rename" option from this submenu. When you do so, the sheet name will get highlighted.
3. Type the new name and press Enter key.

When you do so, the name of the worksheet will change.



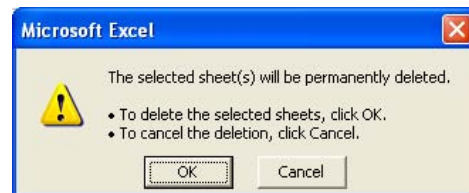
**Figure 7.19**

## Deleting A Worksheet

Perform following steps to remove any worksheet from the workbook:

1. Select the worksheet, which is to be deleted by clicking the mouse on its sheet tab. For example, if fifth worksheet is to be deleted, click the mouse on Sheet5 tab.
2. Click the mouse on "Edit" option of the bar menu. When you do so, Edit submenu, as shown in figure 7.12(a) will appear on the screen.
3. Select "Delete Sheet" option from Edit submenu. When you do so, an alert box, as shown in figure 7.20 will appear on the screen.
4. Click the mouse on "OK" button.

When you do so, current worksheet will get removed from the workbook.



**Figure 7.20**

## FORMATTING CELLS

You are already familiar with the default formatting that automatically takes place, when you enter text, numbers, formulae etc. in the cells (already explained earlier). If the need be the default format for the selected range or the entire worksheet can be changed. In addition to this, many other things like adding comma or \$ sign in numbers, changing alignment of text in cells, applying borders around selected cells etc. can also be done through formatting facility available in MS-Excel. Different types of formatting operations are described below.

### Applying Number Format

Perform following steps to specify the format for the numerical values that would be entered in the cell or range of cells:

1. Select the cell or range of cells, on which you wish to apply the Number format.

2. Select "Format" option from the Bar menu. When you do so, Format submenu, will appear on the screen.
3. Select "Cells" option from Format submenu. When you do so, a dialog box, as shown in figure 7.21 will appear on the screen. If somehow different options appear in the dialog box, click the mouse on "Number" tab.
4. To apply the Number format, select the desired option from "Category" list box. For example:
  - (a) To decide the way, numbers will appear in the cells, click the mouse on "Custom" option, present in "Category" list box. When you do so, a list of formats will appear within the dialog box. Select the desired format.
  - (b) To decide the Date or Time formats, click the mouse on "Date" or "Time" option (respectively), present in category list box. When you do so, many date and time formats will appear, within the dialog box. Select the desired format.
  - (c) Where and at what place the comma should be used in numbers and in what color or format the negative numbers should appear, can be decided by selecting "Number" option present in "Category" list box.
  - (d) Likewise other options can be selected from "Category" list box and related formats can be decided from the options that appear thereafter.
5. To decide how many numbers will appear after the decimal point, make use of the spinner named "decimal places".
6. Click the mouse on "OK" button.

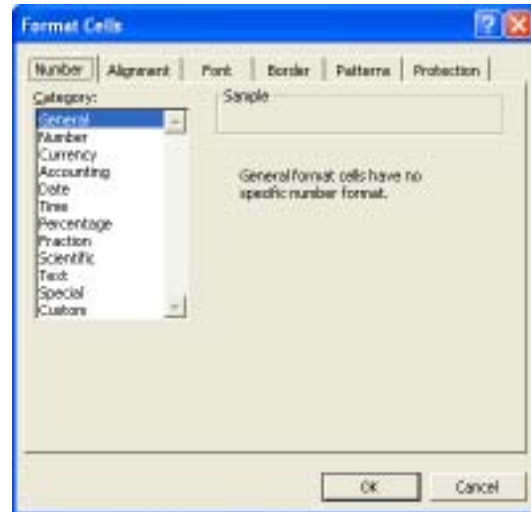


Figure 7.21

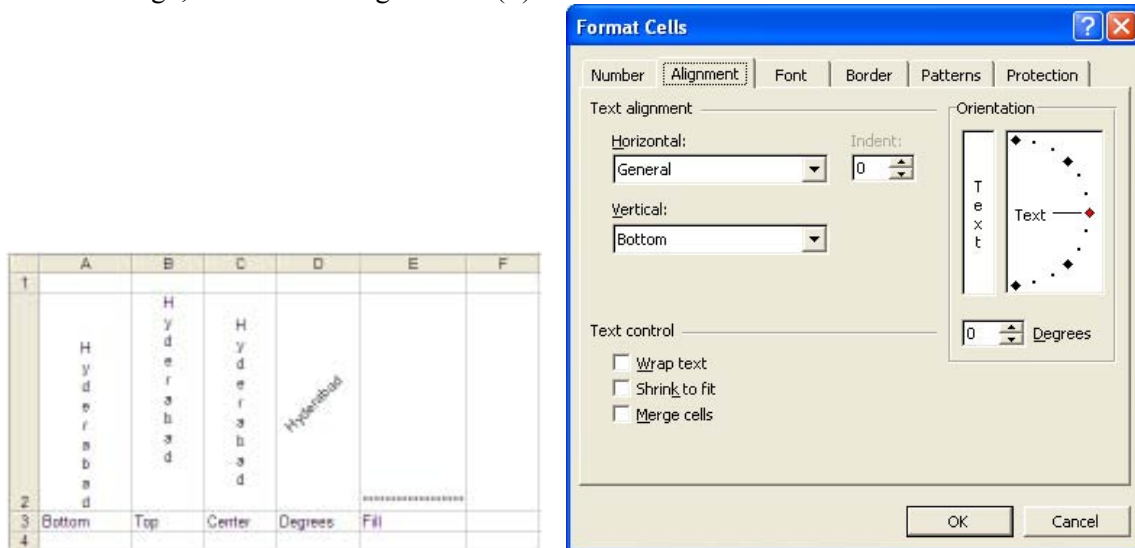
When you do so, all chosen formats will get applied to the selected cells. If the data already exists in the cells, it will get automatically formatted else when the data will be entered in these cells, the format will get applied on them.

### Applying Alignment

Recall that the contents entered in the cell are either left aligned or right aligned. But if the need be, they can be top or bottom aligned or oriented at certain angle, as shown in figure 7.22(a). Note that applying Alignment format to the desired cells does this. Perform following steps for applying this format:

1. Select the cell or range of cells, on which you wish to apply the Alignment format.

2. Select "Format" option from the bar menu. When you do so, Format submenu will appear on the screen.
3. Select "Cells" option from Format submenu. When you do so, a dialog box, as shown in figure 7.21 will appear on the screen.
4. Click the mouse on "Alignment" tab. When you do so, the dialog box options will change, as shown in figure 7.22(b).



(a)

(b)

**Figure 7.22**

5. If the contents of the cell are to be aligned horizontally, select the desired alignment (such as, left, right center etc.), using "Horizontal" drop down list, present in the dialog box. If you wish to fill the whole cell with repeated occurrence of a character, select "Fill" option from this drop down list.
6. If the cell contents are to be vertically aligned, select the desired option, (such as, Top, Bottom, Justify etc.) from "Vertical" drop down list.
7. If the contents of the cell are to be placed diagonally, set the angle of inclination through "Degree" spinner, present in orientation section of the dialog box.
8. If the length of the text is larger than the width of the cell and you wish to wrap the text so that it is accommodated in multiple lines, within the cell, check the "Wrap text" check box.
9. If you wish to shrink the longer text so that it fits within the width of the cell, check, "Shrink to fit" check box.
10. To merge, adjacent cells, so that longer text is accommodated properly, check "merge" cells check box.

11. At last, click the mouse on "OK" button.

When you do so, chosen alignment option will get applied to the selected cells.

## Applying Font Formats

The data that you enter in worksheet is always entered in preset font, font style and font type. These specifications can always be changed either for selected cells or entire worksheet. Perform following steps to apply font format:

1. Select the cell or range of cells, on which you wish to apply Font format.

2. Select "Format" option from the bar menu. When you do so, Format submenu will appear on the screen.

3. Select "Cells" option from Format submenu. When you do so, a dialog box, as shown in figure 7.21 will appear on the screen.

4. Click the mouse on "Font" tab. When you do so, dialog box options will change as shown in figure 7.23.

5. Select the name of the font from "Font" list box.

6. Select font style and font size specifications from respective list boxes.

7. If the characters have to be underlined, select a suitable line type from "Underline" drop down list box.

8. If the text has to be striked out, check "strikethrough" check box, present in effects section of this dialog box.

9. At last, click the mouse on "OK" button.

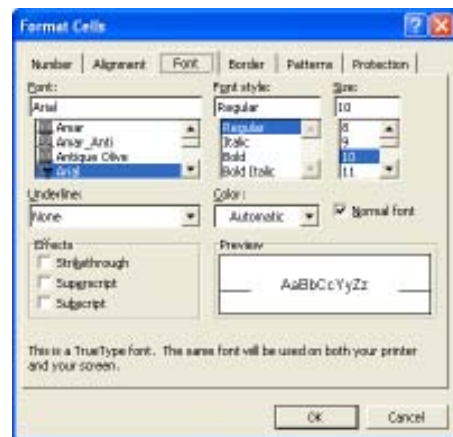


Figure 7.23

When you do so, chosen font specifications will get applied to the selected cell.

## FUNCTIONS

MS-EXCEL has numerous inbuilt formulae in it. The formulae are called functions or Excel functions. Each formula operates upon the given value (either taken from cell or written directly in the function itself) and produces specific result. These functions can either be written directly in the cell or can be included in the formula that you define. Functions are written in following format:

### Function-name (arguments)

Here function-name is the name of the function and arguments are the list of values, separated by comma, on which the function has to operate.

For example, SUM is a valid MS-Excel function. It takes cell addresses or constant numeric values as arguments and returns total. For example, SUM (10, 20, 30) will return 60. Similarly, it can be used as SUM(A1+B1+C1) here A1, B1 and C1 are the cell addresses. If they contain 100, 150 and 200 respectively then this function will return 450.

As mentioned above, you can also use functions in your own formulae. For example, =1000-SUM (A1+B1+C1) is a valid formula. Few commonly used MS-Excel functions are described in the following table:

No.	FUNCTION	PROCEDURE	EXAMPLE	RESULT
1	ABS(number)	Returns absolute value of the number.	=ABS(-200)	200
2	INT(number)	It rounds the number to the nearest integer.	=INT(200.37)	200
4	SQRT(number)	Returns the square root of the number.	=SQRT(64)	8
5	SUM(number1, number2....)	Adds all the number	=SUM(140,30)	170
6	MOD(number1, number2...)	This function divides the first number with the second number and returns the remainder.	=MOD(127,5)	2
7	PRODUCT(number1, number2...)	It multiples all the numbers given and returns the product	=PRODUCT(5,6)	30
8	ROUND(number1, number2...)	It rounds the number to the specified number of digit.	=ROUND(122.66,1) =ROUND(122.6679, 2)	122.7 122.66
9	AVERAGE(number1, number2...)	It returns the average (arithmetic mean) of its arguments.	=AVERAGE(15,17)	16
10	COUNT(value1, value2)	It counts the numbers, which are provided to it as arguments.	=COUNT(1,8,4,9,1)	5
11	MAX(number1, number2)	It returns the largest value in given set of values	=MAX(100,135)	135
12	MIN(number1, number2)	It returns the smallest value in given set of values.	=MIN(100,135)	100
13	LEN(text)	Returns the number of characters in a text string	=LEN("INDIA")	5
14	LEFT(text, value)	This function returns as many leftmost characters of the given text string as specified by value.	=LEFT("INDIA",2)	IN

No.	FUNCTION	PROCEDURE	EXAMPLE	RESULT
15	RIGHT(text, value)	This function returns as many rightmost character of the given text string as specified by value.	=RIGHT("INDIA",2)	IA
16	LOWER(text)	Converts all the uppercase letters in the lowercase	=LOWER("INDIA")	india
17	UPPER(text)	Converts a text string to uppercase	=UPPER("India")	INDIA
18	TRIM(text)	It removes all the spaces from the text string, except for single space between the words.	=TRIM("Hi Dear")	Hi Dear
19	REPT(text, number of times)	It repeats the text, given number of times	=REPT("S",5)	SSSSS

## PRINTING THE WORKSHEET

Perform following steps for printing the worksheet:

1. Select "File" option from the bar menu. When you do so, File submenu, as shown in figure 7.10 will appear on the screen.
2. Select "Print" option from this submenu. When you do so, a dialog box, as shown in figure 7.24, will appear on the screen.
3. Make use of "Name" drop down list box and specify the name of the printer, on which the worksheet is to be printed.
4. Make use of "From" and "To" spinners to specify the pages of the worksheet that are to be printed.
5. Make use of "Number of copies" spinner and specify the number of copies that are to be printed.
6. If the printing is to be done in a file, check "Print to File" check box.
7. After selecting all the required options, click the mouse on "OK" button.

When you do so, printing will start and the worksheet will get printed.



Figure 7.24

## INTRODUCTION TO MS-EXCEL CHARTS

Excel supports 18 different types of charts to represent the data in different forms. Different parts of the chart can also be labeled. Which type of chart will suit best, for the given data will depend upon what the data pertains to and what type of analysis is to be done.

Before we go into the operational aspects of drawing the chart, let's first, get introduced to different types of charts that can be generated in MS-Excel.

## TYPES OF CHARTS

1. Area Chart and 3-D - Area chart.
2. Bar Chart and 3-D - Bar chart.
3. Column Chart and 3-D - Column chart.
4. Line Chart and 3-D - Line chart.
5. Pie Chart and 3-D - Pie Chart.
6. Doughnut Chart and
7. XY Scatter Chart.

Apart from above mention charts, MS-Excel provide following 3-D Charts:

8. 3-D Cylinder Chart.
9. 3-D Cone Chart.
10. 3-D Pyramid Chart.
11. 3-D Surface Chart.

## COMPONENTS OF AN EXCEL CHART

Excel chart not only comprises of Bars, Columns or Pies alone but it comprises of many other components also. Figure 7.25 illustrates different components of MS-Excel chart. A brief description of all its components is also given below.

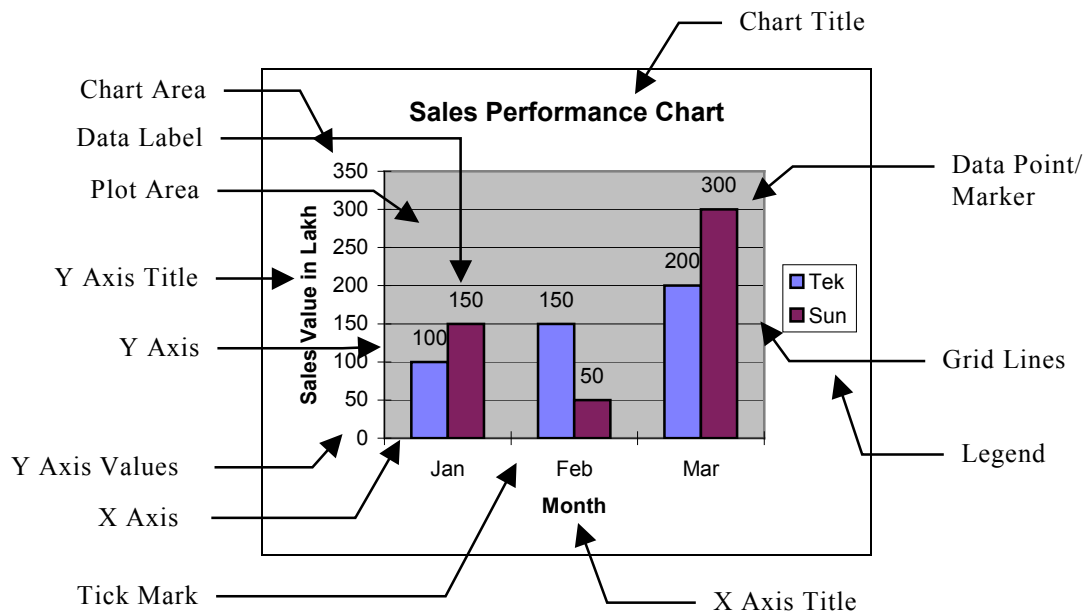


Figure 7.25



- Chart Area** : Chart Area is the entire area that is reserved for accommodating the chart and other components such as legends, titles etc.
- Plot Area** : Plot area is part of chart area, which contains the chart.
- Y Axis** : It is the vertical line whose length and segments represent different values, which you will be making use of, to show the variation of different identities (such as sales, expenditure, profit figures etc.) when you plot the chart.
- X Axis** : A horizontal line, which meets Y axis at right angle, on which you show the variation of another component (such as time, month, year etc.) of the chart. Its length and segments represent different intervals of values.
- Y Axis Title** : Y axis title identifies the values, which have been illustrated on Y axis. For example, simply writing 10, 50, 100, 150 etc. on Y axis doesn't convey the full details of the values. But a Y axis title 'Sales value in Lakh clearly illustrates that the figures written on Y axis represent Sales figures and that too in Lakh.
- X Axis Title** : Similar to Y axis title, X axis conveys details of the X axis values.
- Tick marks** : They are the small lines, used to divide both the axes into small segments, in order to form a scale.
- Grid Lines** : Grid lines are the lines that can be thought of as an extension of tick marks. They help in reading the values of the data points. They are scaled according to the values of the axes.
- Data Series** : Data series is a collection of related values that are plotted on a chart. For example, following are two data series:
- |   | A           | B   | C   | D   | E |
|---|-------------|-----|-----|-----|---|
| 1 |             | Jan | Feb | Mar |   |
| 2 | Sales       | 100 | 50  | 150 |   |
| 3 | Expenditure | 150 | 100 | 200 |   |
| 4 |             |     |     |     |   |
- Data Point** : It represents one value of the data series.
- Data Label** : Data label is some piece of text, which is written near data point, to highlight some aspect of it. For example, writing 'Max' identifies that this data point represents the maximum value of the series.
- Chart Title** : Chart title is the text, written in chart area, which identifies the chart. For example, the chart title, 'Sales Performance Chart' clearly states that the chart has been plotted to represent sales performance of the company/companies, graphically.
- Legends** : Legends are some sort of labels that identify different series that have been plotted in the chart. Generally these labels are attached to a symbol or color or pattern that is associated with the series of the chart. It is used to distinguish one data series from another.

Figure 7.26

## MAKING A CHART USING CHART BAR

In order to make a chart, using chart bar, firstly you have to display the chart bar on the screen and then perform the required steps. The procedure to display the chart bar is explained below:

### Displaying The Chart Bar

Perform following steps to display the Chart Bar on the screens, if it is not there:

1. Select "View" option from the bar menu. When you do so, View submenu, as shown in figure 7.27(a), will appear on the screen.
2. Select "Toolbar" option from View submenu. When you do so, another submenu, as shown in figure 7.27(b), will appear on the screen.
3. Select "Chart" option from this submenu. On doing so, a chart bar, as shown in figure 7.28, will appear on the screen:

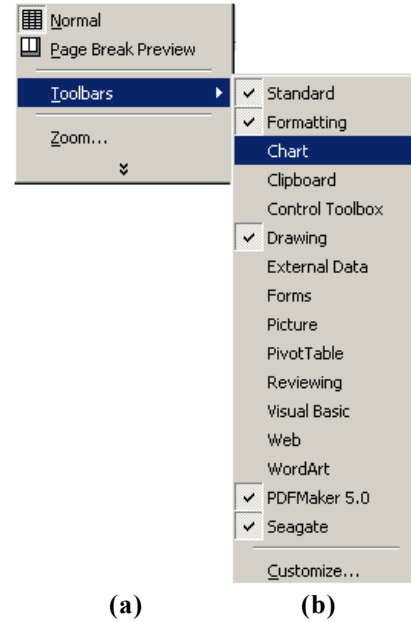


Figure 7.27

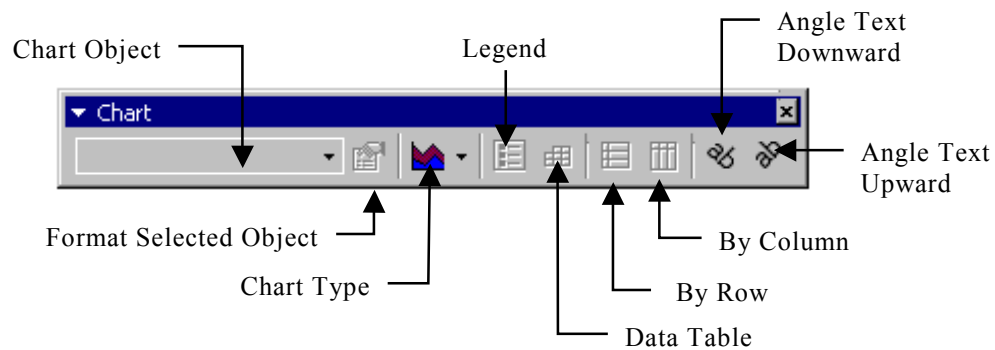


Figure 7.28

### Making A Chart

Perform following steps to prepare the desired chart:

1. Select that portion of the data that has to be transformed into chart. Let's take the example of the data pertaining to three companies viz. Tek, Sun & Net that is shown in figure 7.29(a). Select the range A2:D6.

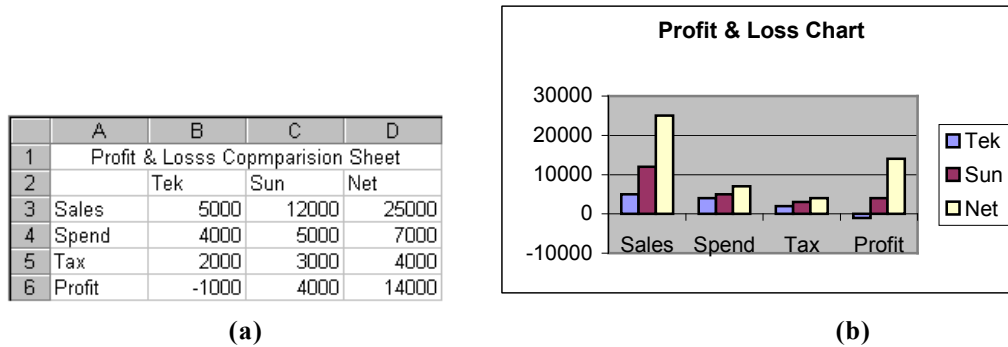


Figure 7.29

2. Now select "Chart Type" button from the chart bar. On selecting this button, MS-Excel will display a chart list as shown in figure 7.30.
3. Select the desired chart type from this list. Say you select Column Chart option from this list.

When you do so, MS-Excel will automatically plot the chart and include it as an object in the worksheet. A Column chart made for the options chosen above is shown in figure 7.29(b).

Refer figure 7.29(b) and note the following points:

1. Clicking on the 'Legend' button will display or hide the legend in the chart.
2. To plot the data series according to the row, click on 'By Row' button. If you want to plot the series according to the column, select the 'By Column' named button.
3. To display the chart text diagonally, select 'Angle text' button.



Figure 7.30

## CHANGING CHART VALUES

Once you have created a chart, its data points (columns in case of Column charts, bars in case of Bar charts, slices in case of Pie charts etc.) get automatically linked to the values (of the worksheet), based on which they were created. Due to this link, on-line updating of charts is possible. In On-line updating, if you change the values in worksheet, corresponding change is automatically reflected in the chart, without giving any command or performing extra function. For example, if you have plotted a column chart for depicting the sales performance of three companies viz. Tek, Sun and Net, in which Tek's sales was Rs. 5000. Now if you change the value from 5000 to 10000 then immediately the height of Tek's column (representing sales figure) will increase.

## INTRODUCTION TO FORMATTING OPERATIONS

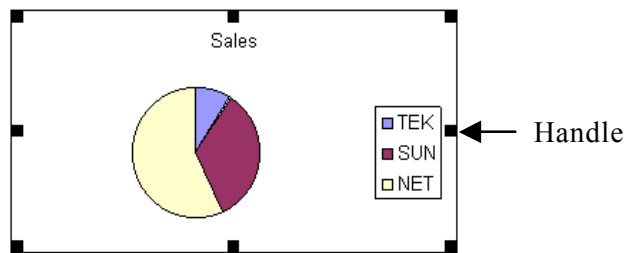
While working with MS-Excel charts, you may be required to perform following types of functions:

1. Change size of the chart.
2. Move the chart to a different suitable location.
3. Change the titles, legends, text etc.
4. Change the font, font size and style etc. of the text.

All such types of operations are called formatting functions. Remember that for most of the formatting functions, first you have to select the chart and then that particular component of the chart that has to be modified and then perform formatting operation on it. The procedure for selecting the chart and its components is described below.

### Selecting The Chart

Chart can be selected by clicking the mouse on it. When you select the chart, handles appear around the chart, as shown in figure 7.31.



**Figure 7.31**

### Selecting Items In A Chart

Perform following steps to select an item of the chart:

1. Select the chart by clicking the mouse on the chart.
2. Now click the mouse on the item that you want to select.

For example, if you wish to select the legend of the chart, first select the chart by clicking the mouse on it and then click it on the legend. When you click the mouse on the item, it gets surrounded with a border with handles, which indicates that this component of the chart has been selected for modification.

### Canceling The Selection

To cancel the selection press Esc (escape) key or click the mouse on any blank space of the worksheet.

### Deleting A Chart

To delete a chart, first select the chart and then press "Del" key of the keyboard.

### Moving The Chart

To move the chart from one location to another, simply select the chart and drag the mouse to the new location. As you drag the mouse, chart will also move along with the mouse pointer. When you release the mouse button the chart will get located at new location.

### Sizing The Chart

To change the size of the chart (increase/decrease), first select the chart and then place the

mouse pointer at any handle. The mouse pointer will change to a double-headed arrow pointer. Now drag the mouse. Dragging the mouse will change the size of the chart.

## Changing The Title In The Chart

Perform following steps to make changes in the title:

1. First select the title that needs to be altered.
2. Now select "Chart" option from the bar menu. When you do so, a submenu, as shown in figure 7.32, will appear on the screen.
3. Now select "Chart Options" option from this submenu. When you do so, a dialog box, as shown in figure 7.33, will appear on screen.
4. Click the mouse in 'Chart Title' text box and enter the title. If you wish to change the title of the chart. If you wish to make changes in X axis title or Y axis title, select corresponding text boxes and enter new titles in the desired text box.
5. At last, click the mouse on "OK" button.

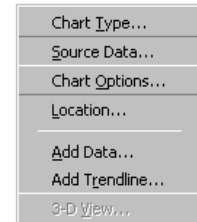


Figure 7.32

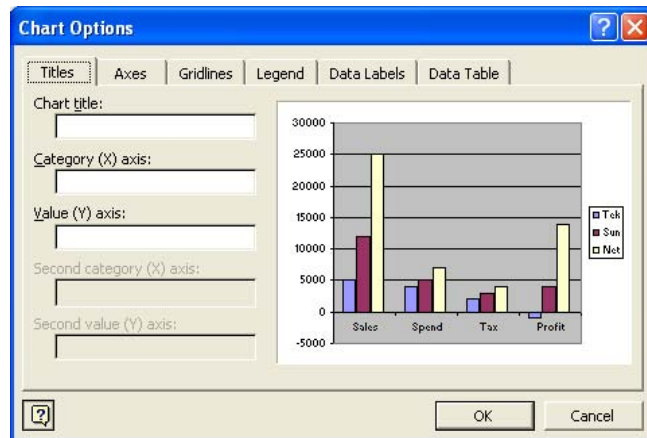


Figure 7.33

When you do so, selected chart will get updated automatically.

## Making Other Modifications In The Chart

Other modifications can be made in the chart by clicking the mouse on other tabs like "Axes", "Gridlines", "Legends", "Data Labels" etc. present in the dialog box and entering modified data in corresponding text boxes that appear within the dialog box.

# PRACTICAL

## ASSIGNMENT -1

Creating a worksheet in Excel for a company:

### (a) Copy, Move and Merge the cell.

- (i) Invoke MS-Excel.
- (ii) Select range A1:E1 and merge the cells by clicking the mouse on "Merge and Center" button present in Format toolbar. Type the heading "Sale in Lakhs".

- (iii) Type labels and enter data, as shown in figure 7.2.
- (iv) Enter formula "`=SUM(B3:D3)`" in cell E3.
- (iv) Copy formula in E3 to E4, E5 and E6. Procedure for copying the formula is given on page 190.
- (vi) Enter formula "`=SUM(C2:C5)`" in cell B6.
- (vii) Copy formula in B6 to C6 and D6.

**(b) Adding comments**

- (i) Perform following steps for adding comments in the worksheet:
  - Select cell A10.
  - Select "Insert" option from bar menu. When you do so, Insert submenu will appear on monitor screen.
  - Select "Comment" option from Insert submenu. When you do so, a comment box for writing comments will appear on monitor screen.
  - Click the mouse within comment box and type comments.

**(c) Adding, Deleting the cell, Row and Columns.**

- (i) Add a new column after Mar to accommodate April figures in the worksheet. Procedure for adding a new column in the worksheet is given on page 195.
- (ii) Add a new row above Total row to accommodate a new company, named Zeta. Procedure for adding a new row in the worksheet is given on page 195.
- (iii) Modify all formulae accordingly to get the sum of all the four months and four companies.
- (iv) Add data for April month and Zeta Company and check your results.

**(d) Hiding and Unhiding the columns, Row and gridlines.**

- (i) Perform following steps to hide the row or column:
  - Select the row or column, which is to be hidden.
  - Select "Format" option from bar menu. When you do so, Format submenu, as shown in figure 7.16(a) will appear on the screen.
  - Select "Row" or "Column" option as per requirement. When you do so, another submenu, as shown in figure 7.16(b) will appear on screen.
  - Select "Hide" option from this submenu.
- (ii) Perform following steps to unhide the row or column:
  - Select the rows/columns, towards left and right of the column that is hidden. For example, if column C is hidden, select column B and D columns.
  - Select "Format" option from bar menu. When you do so, Format submenu, as shown in figure 7.16(a) will appear on the screen.

- Select "Row" or "Column" option as per requirement. When you do so, another submenu, as shown in figure 7.16(b) will appear on screen.
- Select "Unhide" option from this submenu.

## ASSIGNMENT -2

2. Using formula and functions prepare worksheet for storing subject marks of ten students and perform following operations:

(a) *Calculate student wise total and average.*

(i) Prepare a worksheet as shown below.

	A	B	C	D	E	F	G	H
1	<b>Marks List</b>							
2	<b>Name</b>	<b>Phy Marks</b>	<b>Chem Marks</b>	<b>Math Marks</b>		<b>Total</b>	<b>Average</b>	<b>Percentage</b>
3								
4	Ram Kumar	60	75	68				
5	Laximi	80	78	78				
6	Hari Krishnan	65	98	98				
7	Ajit Sharma	89	89	78				
8	Pooja	87	78	85				
9	Sohan Lal	98	91	96				
10	Rani	78	82	60				
11	Rahul	85	79	68				
12	Ravi	78	76	66				
13	Sunita	92	75	85				
14								
15	<b>Total</b>							
16	<b>Average</b>							
17	<b>Over All Percentage</b>							

- (ii) To calculate student wise total, enter formula "`=SUM(B4:D4)`" in cell F4.  
 (iii) Copy formula in cell F4 to cell F5, F6, F7, F8, F9, F10, F11, F12 and F13.  
 (iv) To calculate student wise average, enter formula "`=AVERAGE(B4:D4)`" in cell G4.  
 (v) Copy formula in cell G4 to cell G5, G6, G7, G8, G9, G10, G11, G12 and G13.

(b) *Calculate the subject wise total and average.*

- (i) To calculate subject wise total, enter formula "`=SUM(B4:B13)`" in cell B15.  
 (ii) Copy formula in cell B15 to cell C15 and D15.  
 (iii) To calculate subject wise average, enter formula "`=AVERAGE(B4:B13)`" in cell B16.  
 (iv) Copy formula in cell B16 to cell C16 and D16.

**(c) Calculate the overall percentage and also individual percentage of the student.**

- (i) To calculate student wise percentage, enter formula " $=F4*100/300$ " in cell H4.
- (ii) Copy formula in cell H4 to cell H5, H6, H7, H8, H9, H10, H11, H12 and H13.
- (iii) To calculate overall percentage, enter formula " $=SUM(B15:D15)*100/3000$ " in cell B17.

After completion of assignment 2, above mentioned worksheet will display results as shown below.

	A	B	C	D	E	F	G	H
1	<b>Marks List</b>							
2	<b>Name</b>	<b>Phy Marks</b>	<b>Chem Marks</b>	<b>Math Marks</b>		<b>Total</b>	<b>Average</b>	<b>Percentage</b>
3								
4	Ram Kumar	60	75	68		203	67.67	67.67
5	Laximi	80	78	78		236	78.67	78.67
6	Hari Krishnan	65	98	98		261	87.00	87.00
7	Ajit Sharma	89	89	78		256	85.33	85.33
8	Pooja	87	78	85		250	83.33	83.33
9	Sohan Lal	98	91	96		285	95.00	95.00
10	Rani	78	82	60		220	73.33	73.33
11	Rahul	85	79	68		232	77.33	77.33
12	Ravi	78	76	66		220	73.33	73.33
13	Sunita	92	75	85		252	84.00	84.00
14								
15	<b>Total</b>	812.00	821.00	782.00				
16	<b>Average</b>	81.20	82.10	78.20				
17	<b>Over All Percentage</b>	80.50						

**ASSIGNMENT -3**

3. Create a Pie chart for the following data:

6's-7	-	42
4's-38	-	152
3's-5	-	15
2's-15	-	30
1's-21	-	21

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<b>Total</b>		<b>260</b>
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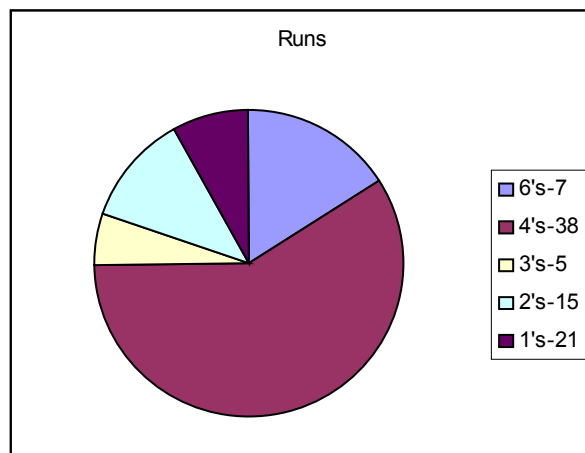
- (i) Perform following steps to create a Pie chart for given data:
  - Invoke MS-Excel and create following worksheet.



	A	B
1	<b>Sachin Tendulkar's Score</b>	
2	<b>Strokes</b>	<b>Runs</b>
3	6's-7	42
4	4's-38	152
5	3's-5	15
6	2's-15	30
7	1's-21	21

- Select the range A2:B7.
- Make a pie chart using the procedure mentioned on page 204.

After completion of assignment 3, above mentioned data will get transformed into a pie chart, as shown below.



## ASSIGNMENT -4

(a) Create a Bar chart for the following data:

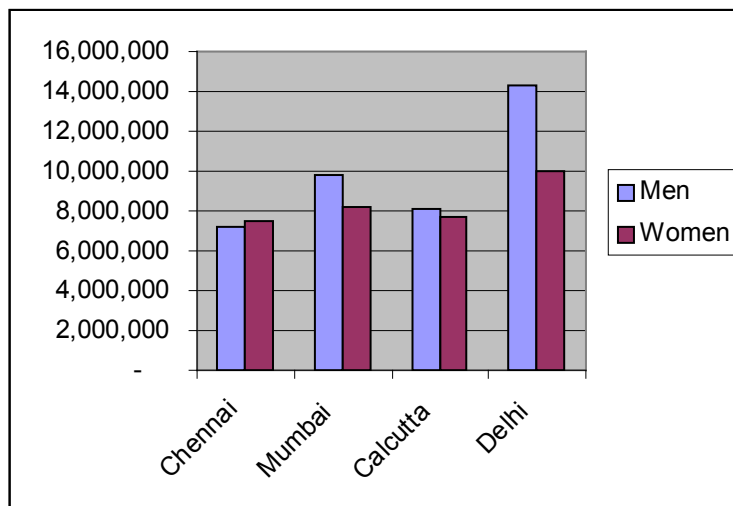
Chennai:	Men-71, 55, 294	Women- 75, 24, 115
Mumbai:	Men-98, 00, 987	Women- 82, 33, 678
Calcutta:	Men-81, 24, 865	Women-77, 28, 346
Delhi:	Men- 1, 43, 25, 086	Women- 99, 87, 242

- (i) Perform following steps to create a Column chart for given data:
- Invoke MS-Excel and create following worksheet.

	A	B	C
1	Population Data		
2		Men	Women
3	Chennai	7,155,294	7,524,115
4	Mumbai	9,800,987	8,233,678
5	Calcutta	8,124,865	7,728,346
6	Delhi	14,325,086	9,987,242

- Select the range A2:C6.
- Make a column chart, using the procedure mentioned on page 204.

After completion of assignment 4, above mentioned data will get transformed into a Column chart, as shown below.



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# Computer Application Laboratory

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## CHAPTER

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# 8

### *MS-PowerPoint*

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#### **INTRODUCTION**

Be it internal activities of any office or external affairs of an organization, effective communication plays a major role in their success. In order to make the communication effective, innovation and creativity, both have to be built into the presentation. Unless the presentation is interesting, audience will not pay attention to the speaker.

Computer is a modern tool, which helps in building impressive presentations and presenting a subject before the audience in interesting way. PowerPoint is one of the most popular software, which is used for making computer-based presentations.

#### **MANUAL PRESENTATION**

When a speaker speaks on a subject, before the audience it is said that he is making a presentation. For example, when Managing Director of an organization addresses Sales Managers to communicate sales plan of the next year, it is said that he is making a presentation. Similarly in an exhibition, exhibiter makes a presentation of his product before the crowd. Well, all these examples are of manual presentation.

#### **POWERPOINT PRESENTATION**

PowerPoint presentation is basically a series of slides, containing information of the subject, which is to be put before the audience.

They appear on computer screen, one after the other, either automatically or on a click of mouse.

#### **ELEMENTS OF POWERPOINT PRESENTATION**

In order to make the presentation impressive, slides of the PowerPoint presentation may contain multimedia elements like text, graphics audio, animation, video etc. in them. Thus these elements put together open multi channels of communication and make the presentation more convincing.

## GETTING STARTED WITH POWERPOINT

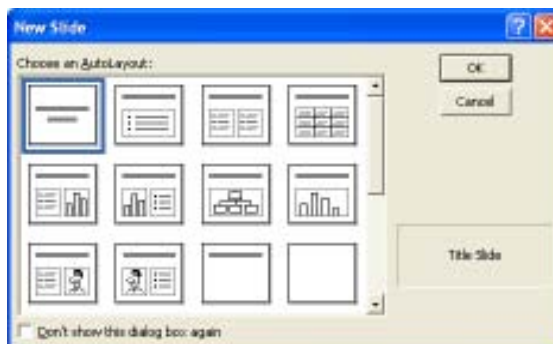
To start work in PowerPoint, make sure that computer is properly booted with Windows and after that perform the following steps:

1. Click the mouse on "Start" button, present on desktop. When you do so, Start menu, as shown in figure 2.1(a), will appear on the screen.
2. Select "All Programs" option from Start menu. When you do so, another submenu, as shown in figure 2.1(b) will appear on the screen.
3. Select "Microsoft PowerPoint" option from this submenu. When you do so, a dialog box, as shown in figure 8.1, will appear on the screen.
4. To open a new blank presentation, select "Blank Presentation" option from this dialog box.
5. Now click the mouse on "OK" button. When you do so, a dialog box for selecting the slide layout, as shown in figure 8.2, will appear on the screen.
6. Select the desired layout from this dialog box. Say you select "Text & ClipArt" layout.
7. Now click the mouse on "OK" button. When you do so, selected layout, within the PowerPoint window, as shown in figure 8.3, appear on the screen.



**Figure 8.1**

Now you can add desired contents in the slides. The procedure for including different items in the slides is explained below.



**Figure 8.2**



**Figure 8.3**

### Adding Title In The Slide

To add title in the slide, click the mouse in Title placeholder and Type the title. If you wish to change the font, font size and font style, drag the mouse on text and select desired specifications, using respective objects (like drop down lists, buttons etc.), present in Format toolbar.

## Adding Text In The Slide

Click the mouse within Text placeholder and type the text. To change the font specifications, follow the method mentioned above.

## Adding Clipart In The Slides

PowerPoint has an inbuilt graphics library of its own. To include pictures from that library, into the slide, perform following steps:

1. Double click the mouse within ClipArt placeholder. When you do so, ClipArt dialog box, as shown in figure 8.4, will appear on the screen.
2. Select a category of the clipart from this dialog box, by double clicking the mouse on desired category icon. When you do so, all the clip arts available in the selected category appear on the screen, as shown in figure 8.5.



Figure 8.4



Figure 8.5

3. Click the mouse on desired clipart. When you do so, a graphical popup menu, as shown in figure 8.6, will appear on the screen.
4. Now click the mouse on "Insert Clip" option.

When you do so, the selected clip art will get included in the slide.

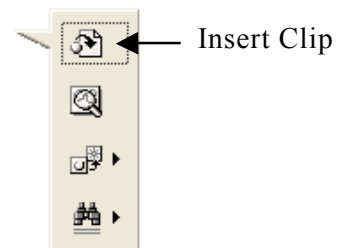


Figure 8.6

## Including Notes

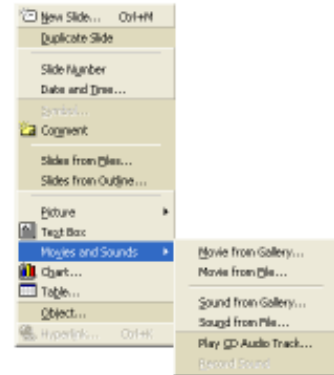
To include a brief description, or remarks about the slide, so as to make the slide more informative, click the mouse in Notes placeholder and type the contents.

Note that these contents (notes) are for documentation purpose only. They do not get displays when the slide show goes on.

## Adding Background Sounds In The Slide

Perform following steps to add background sound or music in the slides:

1. Select "Insert" option from the Bar menu. When you do so, Insert submenu, as shown in figure 8.7(a), will appear on the screen.
2. Select "Movies and Sounds" option from Insert submenu. When you do so, another submenu, as shown in figure 8.7(b), will appear on the screen.
3. Select the desired option from this submenu. Say you select "Sound from File" option. When you do so, a dialog box, as shown in figure 8.8, will appear on the screen.
4. Using this dialog box, select the disk, folder and the file in which the background music/sound exists.
5. Click the mouse on "OK" button. When you do so, an alert box, as shown in figure 8.9 will appear on the screen.
6. If you wish that the sound should automatically play, when the slide appears on the screen, during the slide show, click the mouse on "Yes" button. On the other hand if the sound is to be played on the click of the mouse (when slide comes on screen, during the slide show), click the mouse on "No" button.



(a) (b)  
Figure 8.7

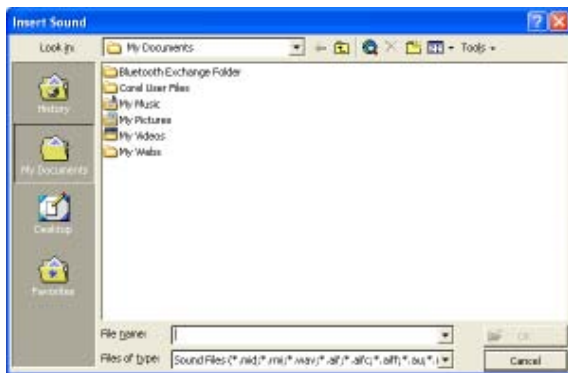


Figure 8.8

When you do so, a small speaker symbol will get included within the slide, indicating that sound has been included in the slide.

To remove the sound, select the speaker symbol by clicking the mouse on it and then press Del or Backspace key.



Figure 8.9

## ADDING NEXT SLIDE TO THE PRESENTATION

After completion of the first slide, next slide can be added to the presentation. For this, perform following steps:

1. Select "Insert" option from the Bar menu. When you do so, Insert submenu, as shown in figure 8.7(a) will appear on the screen.

2. Select "New Slide" option from Insert submenu. When you do so, a dialog box, as shown in figure 8.2 for selecting the slide layout, will appear on the screen.
3. Select the desired layout from this dialog box and click the mouse on "OK" button. When you do so, placeholders as shown in figure 8.3, will appear within PowerPoint window.
4. Now add the desired contents, like text, graphics, notes etc. to the slide, following the methods, mentioned above.

Following above mentioned method, you can add as many slides to the presentation as you want.

## DIFFERENT SLIDE VIEWS

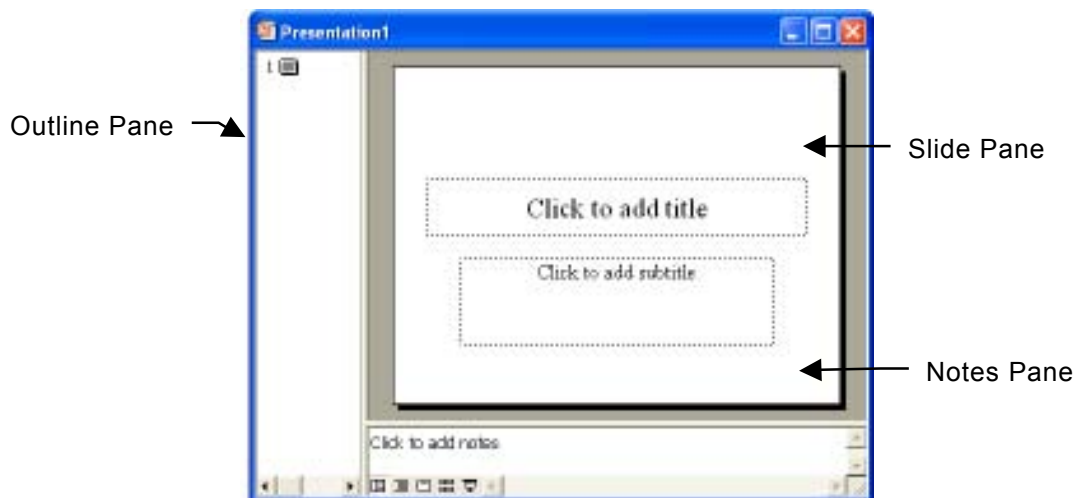
Once the slides of the presentation have been made they can be viewed in different modes. PowerPoint offers following modes for viewing the slides:

1. Normal View
2. Outline View
3. Slide view
4. Slide Sorter View
5. Slide Show View

Each mode serves a different purpose and offers ease of operations, while performing specific type of task. A brief introduction of each mode is given below.

### Normal View

A slide and its contents, as they would appear in Normal View are shown in figure 8.10.



**Figure 8.10**

Refer this figure and note that Normal View comprises of three panes. These panes are Outline pane, Slide pane and Notes pane.

In outline pane, title and the text get displayed in hierarchical order. It is generally utilized for organizing the slides, within the presentation and text within the slides. For example, the text can be added modified, shifted or deleted in outline pane. Similarly position of the slides can also be changed by dragging and dropping them at desired place.

In slide pane, the physical appearance of the slide gets displayed. Note that if slide includes graphics, pictures etc. they do not get displayed in outline pane. They are visible in slide pane.

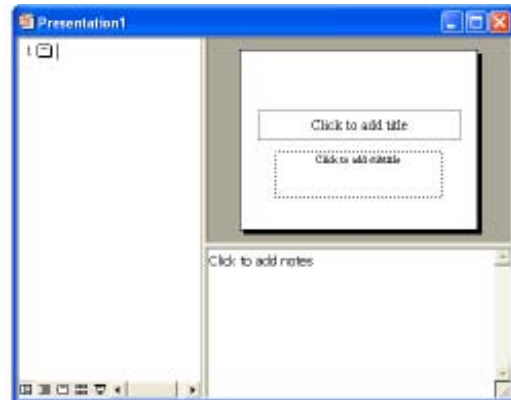
Notes pane is the place, where speaker notes or important information that is to be shared with audience, is maintained.

### Outline View

A slide and its contents, as they would appear in Outline View, are shown in figure 8.11.

Refer this figure and note that it is basically a rearrangement of Normal View. In this view, outline pane occupies larger space and Slide Pane becomes smaller.

For rearranging the contents and the slides, outline view comes handier than Normal View.



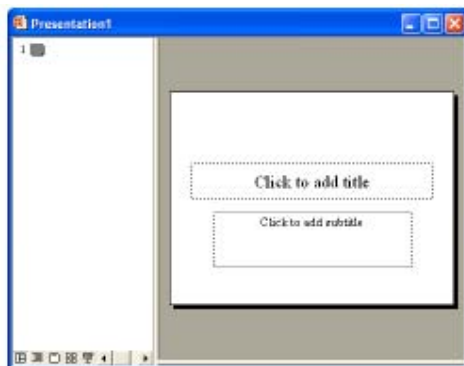
**Figure 8.11**

### Slide View

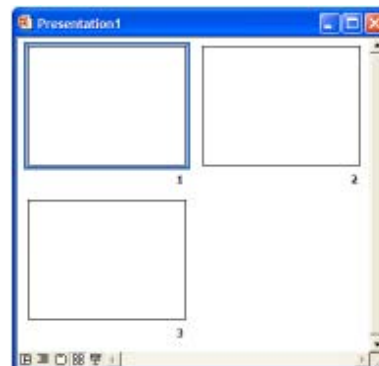
As the name indicates, in Slide View, single slide gets displayed at a time. Physical appearance of the slide gets displayed in a larger area. To modify the contents, slide can be displayed in Slide View mode and then changes can be made. An idea of Slide View mode is given in figure 8.12.

### Slide Sorter View

In slide sorter view, all the slides of the presentation get spread across the screen in miniature form. An idea of this mode is given in figure 8.13. While working in this mode, you get an idea of how the presentation will flow. If the need be, rearrangement of the slides can be done in this mode.



**Figure 8.12**



**Figure 8.13**



## Slide Show View

In this mode, all the slides of the presentation appear one after the other on the screen either automatically or on a click of mouse. More details of this mode are given later in this chapter.

## Switching from One View Mode To Other

Refer figure 8.3 and note that at the bottom left corner of PowerPoint window there are five view buttons. Each button corresponds to a view mode. To switch over to a view mode, you need to click the mouse on corresponding button. For example, if you are in Normal View mode and wish to switch over to Slide Sorter view mode, you will have to click the mouse on Slide Sorted view button.

## MAKING THE SLIDE SHOWS ATTRACTIVE

Slide shows can be made attractive by including artistic text, animation etc. in the slides. Methodology of including these items is described below.

### Adding WordArt in the slide

WordArt is integrated software of PowerPoint (as a matter of fact, MS-Office), using which words can be written in artistic way. These words can be included anywhere in the slide, so as to improve its appearance. PowerPoint extends its WordArt facility to the users through its drawing toolbar. Refer figure 8.16(b) and note that Drawing toolbar has "Insert WordArt" button.

Perform following steps to include WordArt in the slides:

1. Display that slides in Normal view, in which the WordArt is to be included.
2. Click the mouse on "Insert WordArt" button present in Drawing toolbar. When you do so, WordArt gallery of styles, as shown in figure 8.14, will appear on the screen.
3. Select the desired style, in which you wish to shape the text (word) and click the mouse on "OK" button. When you do so, a dialog box, as shown in figure 8.15, for typing the text (word), will appear on the screen.
4. Select font, font size etc. using respective drop down lists and type the text in "Text" text box.



Figure 8.14

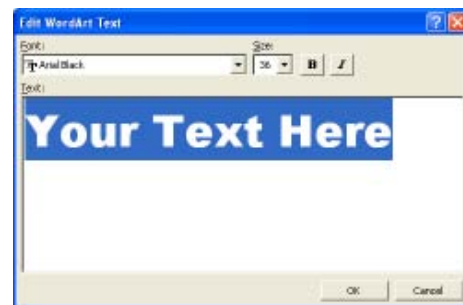


Figure 8.15

5. At last, click the mouse on "OK" button.

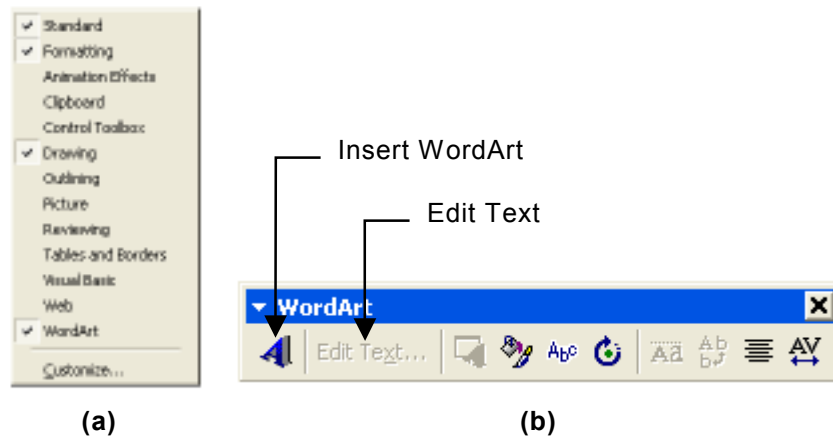
When you do so, the typed text will get written in the selected style within the slide.

## Manipulating WordArt

To make modifications in WordArt, following steps can be performed:

1. To move the WordArt, drag it from its original place, drop it at another place.
2. To change the size of the WordArt, drag the drawing by handles.
3. To make other operations on WordArt, right click the mouse on any toolbar present on the screen. When you do so, a popup menu, as shown in figure 8.16(a), will appear on the screen.

Select "WordArt" option from this menu. When you do so, WordArt toolbar, as shown in figure 8.16(b), will appear on the screen.



**Figure 8.16**

- (i) To edit the word, click the mouse on "Edit Text" button. When you do so, the dialog box, shown in figure 8.16(b), will appear on the screen.

Type the new word and click the mouse on "OK" button.

When you do so, new word will replace the old word.

- (ii) To modify the style, click the mouse on "Word Art gallery" button. When you do so, a dialog box, as shown in figure 8.14 will appear on the screen.

Select the new style and click the mouse on "OK" button. When you do so, the style will change.

- (iii) To make modifications in the style, click the mouse on "WordArt Shape" button. When you do so, a graphical menu, as shown in figure 8.17 will appear on the screen.



**Figure 8.17**

Select the desired shape from this menu. When you do so, shape of the selected style will change.

- (iv) To rotate the WordArt, select the WordArt and click the mouse on "Rotate" button, present in WordArt toolbar.

When you do so, rotate handles will surround the drawing. Now rotate the drawing by dragging it by these handles.

- (v) To color the WordArt, click the mouse on "Format WordArt" button. When you do so, a dialog box, for color selection, will appear on the screen.

Select the desired colors and click the mouse on "OK" button.

- (vi) If required, inter character spacing could be changed by clicking the mouse on "WordArt Character Spacing" button, present in "WordArt" toolbar and then selecting the desired spacing from the menu that appears thereafter.

## Applying Animation

To make the presentation interesting, objects of the slides can be animated. In PowerPoint, animation is applied through "Animation Effects" toolbar. Usually it doesn't remain present on the screen but it can be made to appear by right clicking the mouse on any toolbar and then selecting "Animation Effects" option from the popup menu that appears thereafter (refer figure 8.16(a)).

Animation Effects toolbar is shown in figure 8.18.



**Figure 8.18**

Perform following steps to apply animation in any slide:

1. Make the slide appear in Normal view mode.
2. To animate the title of the slide, click the mouse on "Animate Title" button, present in Animation Effects toolbar. On the other hand, if you wish to animate the text of the slide, select "animate Slide Text" button.
3. Select the desired animation effect by clicking the mouse on corresponding button (such as Drive-In effect, Flying effect etc.) present in Animation Effects toolbar.
4. If more than one object are to be animated on the slide, their animation order can be selected through "Animation Order" drop down list, present in the toolbar.
5. To preview the effect of selected animation effects, click the mouse on "Animation Preview" button, present in toolbar.
6. When you do so, a small window will appear on the screen and animation effects will get displayed in that window.

Once all the effects have been applied, slide show can be run.

## **INTRODUCTION TO SLIDE SHOW**

In slide show, all the slides of the presentation get displayed on the screen, one by one. Next slide replaces the previous slide in attractive and eye-catching manner. Slide shows can be of following types:

1. Manual Slide Show
2. Automatic Slide Show

Basic characteristics of both types of slide shows are described below.

### **Manual Slide Show**

In manual slide show, one slide replaces the other slide only when space bar is pressed or mouse is clicked. Till the time any of these two events doesn't take place, slide remains visible on the screen.

### **Automatic Slide Show**

In automatic slide show, each slide has a time duration called Slide Timing, assigned to it. It remains there on the screen, for this duration and as soon as time duration is over, next slide of the presentation replaces it.

### **Looped Slide Shows**

A slide show, be it automatic or manual, is said to be running in loop, if after the display of last slide, first slide of the presentation replaces it again and again.

## **TRANSITION EFFECT**

The way one slide replaces the other slide, during the slide show is called. Transition Effect. For example, the next slide may take entry on the screen from left hand side and gradually replace the previous slide. Similarly, in other transition effect the first slide may tear apart from the middle, as if stage curtains are sliding left and right and the next slide is gradually becoming visible in back.

PowerPoint offers many transition effects, which can be selected and applied to one, many or all slides of the presentation.

### **Applying Transition Effect and Slide Timings**

Perform following steps to apply slide timings and transition effect to the slides of the presentation:

1. Open the presentation and display the slide, in which the transition effect or slide timing is to be applied, in Normal View mode.
2. Select "Slide Show" option from the Bar menu. When you do so, Slide Show submenu, as shown in figure 8.19(a) will appear on the screen.

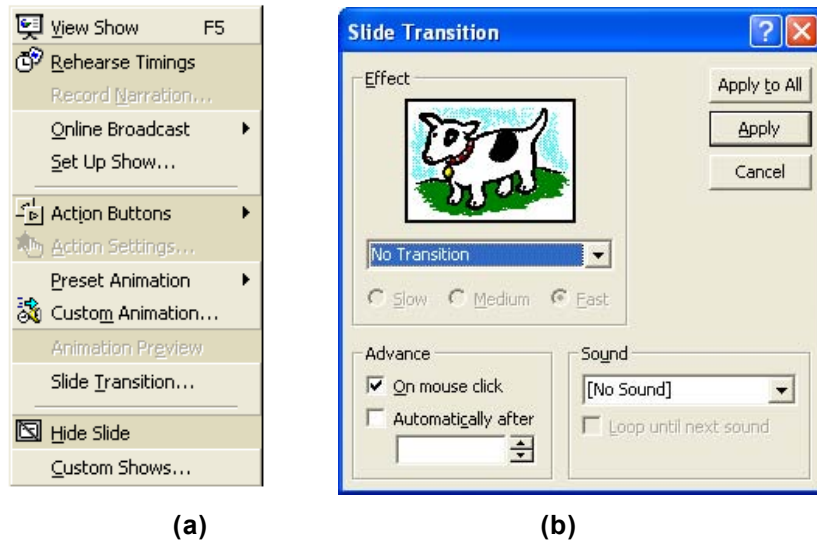


Figure 8.19

3. Select "Slide Transition" option from this submenu. When you do so, a dialog box, as shown in figure 8.19(b) will appear on the screen.
4. Select the desired transition effect from "Effect" dropdown list.
5. Select the speed of the transition (i.e. how fast the replacement of one slide by the other has to be done) by clicking the mouse on Show, Medium or Fast radio button.
6. If the slide show has to advance on the click of the mouse, check "On mouse click" check box.
7. If slide timing is to be assigned to the slide, check "Automatically after" check box and specify the time duration (for which the slide has to stay on the screen), using corresponding spinner.
8. If sound is to be produced on its appearance on screen, select a sound clip from "Sound" drop down list.
9. If the sound clip is to be played till the time other sound is invoked, check "Loop until next sound" check box.
10. If these settings are to be applied to the current slide only, click the mouse on "Apply" button. On the other hand, if the settings are to be applied to all the slides of the presentation, select "Apply to All" button.

When you do so, selected transition effect and chosen slide timing will get applied to the slides.

## SETTING UP THE SLIDE SHOW

After making the slides and applying transition, certain parameters related to slide show need to be set. Perform following steps to set parameters:

1. Open the presentation for which the parameters need to be set.
2. Select "Slide Show" option from the Bar menu. When you do so, Slide Show menu, as shown in figure 8.19(a), will appear on the screen.
3. Now select "Set up Show" option from this submenu. When you do so, a dialog box, as shown in figure 8.20, will appear on the screen.



Figure 8.20

4. To run the slide show in loop, either select "Browsed at a kiosk (full screen)" radio button or check "Loop Continuously until Esc" check box.
5. If narration and animation, present in the presentation are to be displayed, check the corresponding check boxes.
6. If all the slides of the presentation have to participate in the slide show, select "All" radio button else select "From", button and specify the slide numbers that have to appear in the slide show. For this, make use of the "From" and "To" spinners, present in the dialog box.
7. If the slide show has to run in manual mode (slides advance on the click of mouse or on pressing space bar), select "Manually" radio button. For automatic slide show, select "Using timings, if present" radio button.
8. At last, click the mouse on "OK" button.

When you do so, slide show will get ready to run as per the specifications set by you.

## **RUNNING THE SLIDE SHOW**

Perform any one of the methods described below to run the slide show:

1. Click the mouse on "Slide Show" view button, present at the left bottom of PowerPoint window.
- or
2. Select "View Show" option from "Slide Show" submenu (refer figure 8.19(a)).

# PRACTICAL

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## ASSIGNMENT -1

1. Preparing a presentation for introducing your friend.
  - Collect detailed information about your friend and arrange it under following headings. You can use these headings and details as slide contents.

Title	Contents
My Friend	Name of the friend and few sentences in his appreciation.
Merits	Few strong aspects of his personalities.
Achievements	Few achievements of his life.
Interest	His likes, dislikes and hobbies.
My Relationship	What you feel about your relationship with him and why he is so special for you.
His Plans and Dreams	His plans for future.
Summary	Write a good quotation on friendship.

- Create all slides mentioned above.
- Now run the slide show and test the presentation.
- Apply transition effect in the slides. Procedure for applying transition effect is given on page 222.
- Run the slide show again.
- Add background sound in the slides. Procedure for applying background sound is given on page 216.
- Run the slide show again.
- Apply slide timings to the slides and run the presentation in automatic mode. Procedure for applying slide timings is given on page 222.
- Run the slide show in loop.

## ASSIGNMENT - 2

1. Perform following steps to create a presentation for the story; "An Astrologer's Day", written by R. K. Narayanan.

Collect detailed information about the story; "An Astrologer's Day", written by R. K. Narayanan and prepare slide contents as mentioned below.

<b>Title</b>	<b>Contents</b>
Introduction	An introduction about the story.
Main Characters	A brief introduction of main characters in the story.
About Author	Few sentences about the author.
Summary	Brief summary of the story.
Comments	Your comments on the story.

- Create all slides mentioned above.
- Now run the slide show and test the presentation.
- Add clip arts in few slides. Procedure for adding clip arts is given on page 215.
- Run the slide show again.
- Apply transition effect in the slides. Procedure for applying transition effect is given on page 222.
- Run the slide show again.
- Make animation toolbar on and apply animation in first slide. Procedure for applying animation effects is given on page 221.
- Run the slide show again.
- Apply slide timings to the slides and run the presentation in automatic mode. Procedure for applying slide timings is given on page 222.
- Run the slide show in loop.

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# Computer Application Laboratory

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## CHAPTER 9

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### *Internet*

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Internet is basically a global computer network. Its computers are geographically located in almost all major cities of all major countries.

Computers of Internet are linked together through various types of communication medium and devices for the exchange of data and sharing of resources.

Unlike on-line services, which are centrally controlled, Internet is decentralized by design. Services of Internet are populated on specific type of computers, which all the 24 hours remain accessible. Such computers are called servers. Servers are generally large computers with fast processing speed and high speed connections.

Those computers of Internet, which get connected to it, as and when they need services from Internet, are called web clients.

Computer of Internet are either identified by a unique number called IP address or a unique name, called domain name. Either by mentioning the IP address or the domain name corresponding server can be accessed and services present on it can be availed.

To avail any Internet service, you need to first get connected to Internet and then go to the server which offers required services. There are many ways to get connected to Internet:

1. Through dialup connection.
2. Through broad band connection.
3. Through ISDN connection.
4. Through DSL connection.
5. Through cable modem.
6. Through wireless connection.
  - Using mobile phone
  - Wireless LAN
  - Wireless WAN
  - Satellite connection

The process of moving around Internet and accessing web servers is called web surfing or web browsing. The software, using which web surfing/browsing is done is called web browser.

Internet Explorer, Mozilla, Firefox, Safari etc. are few commonly used web browsers that are used for browsing and performing other Internet related tasks.

Following are few common services of Internet:

1. E-mail
2. Chatting
3. Internet telephony
4. Information search
5. Video conferencing
6. Shopping
7. Seat booking in trains and aircrafts
8. Advertising and marketing
9. Games
10. Music
11. Videos
12. Animation
13. Learning
14. News and articles
15. Greetings and astrology

# PRACTICAL

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## ASSIGNMENT -1

### *(a) Creating an E-Mail account:*

- (i) Perform following steps to open an e-mail account on yahoo.com:
  - Connect to Internet and access yahoo.com. When you do so, a web page as shown in figure 4.33 will appear in browser window.
  - Now click the mouse on "Mail" link. When you do so, a web page, as shown in figure 9.1, will appear in browser window.
  - Now click the mouse on "Sign Up" link. When you do so, a web page, as shown in figure 9.2 will get displayed in the browser window.

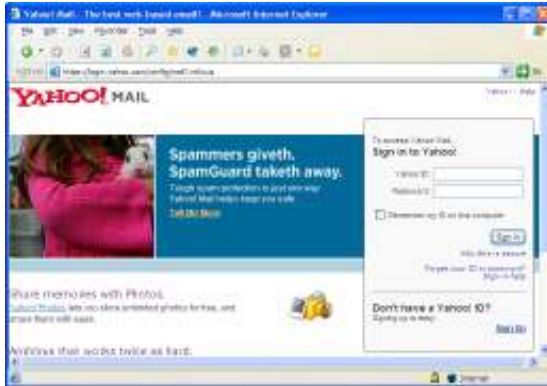


Figure 9.1



Figure 9.2

- Refer web page, shown in figure 9.2 and note that it is basically a form, which accepts details from the user for creating his account. Enter your details in each field.
- After filling the form, click the mouse on "Submit This Form" button (not shown in the figure, as it appears at the bottom of the web page. It will appear when you scroll the page.) When you do so, your e-mail account will be created and a web page, as shown in figure 9.3, will get displayed.
- After creating the account, yahoo sends a test mail into your account to confirm that mail transactions are taking place correctly in your account. To check your test mail (described above), click the mouse on "Continue to Yahoo Mail" button. When you do so, a web page, as shown in figure 9.4 will get displayed in your browser window, showing you that you have 1 unread message in your account.
- Now you can either check your test mail by clicking the mouse on Inbox(1) link or exit from e-mail by clicking the mouse on "Sign Out" link.



Figure 9.3



Figure 9.4

**(b) Viewing an E-Mail received from you friend /relative.**

(i) Perform following steps for reading e-mail:

- Get connected to Internet and access yahoo.com, where you had created your e-mail account. When you do so, yahoo's first web page, as shown in figure 4.33, will get displayed.
- Now click the mouse on "Mail" link. When you do so, a web page, as shown in figure 9.1, will appear on the screen.
- Now enter your login name in the text box titled, "Yahoo ID" and password in "Password" text box.
- Now click the mouse on "Sign In" button. When you do so, a web page, as shown in figure 9.4, will appear on the screen.
- If you wish to read the letters that you have received, click the mouse on "Check Mail" button. When you do so, a list of all the received letters will get displayed in the form of a web page, as shown in figure 9.5.
- Refer above-illustrated figure and note that the details of the received letters are displayed under different headings. Description and meaning of all the headings are as follows:

**Figure 9.5****Title****Meaning**

- Sender** It signifies the name of the person who has sent the e-mail.
- Subject** This is the title of the letter, which gives an idea of the contents of the letter.
- Date** It specifies the date, on which the e-mail was received.
- Size** It signifies the size of the mail in Kilo bytes.
- Note that in this list, certain titles are displayed in bold letters, while some of them are displayed in the normal. The title displayed in bold letters, signifies that this letter has not yet been read. On the other hand, the letters, which have been read, are displayed in the normal text.
  - In order to read any letter, click the mouse on its title. As soon as you do so, the letter will get displayed on the screen and you will be able to read it. A sample letter that gets displayed in this way is shown in figure 9.6.

- Refer figure 9.6 and note that there is a button titled "Reply". This button, when clicked, allows you to send the reply of the letter, without coming out of the letter.
- If, after reading the letter, the letter is to be deleted from the inbox, select appropriate checkbox and click the mouse on "Delete" button.
- After reading the letter, if you click the mouse on "Back" button, you will return back to the Inbox, which is shown in figure 9.5.
- To read any other letter from the inbox, click the mouse on the desired title and repeat the process described above.
- When you have read all the letters, select "Sign out" option. When you do so, you will exit from e-mail program.



Figure 9.6

**(c) Sending E-Mail to a known address.**

- Perform following steps for sending e-mail to any user:
  - Get connected to Internet and access yahoo.com. When you do so, yahoo's first web page gets displayed as shown in figure 4.33.
  - Now click the mouse on "Mail" link. When you do so, a web page, as shown in figure 9.1 will appear on the screen.
  - Now enter your login name in the text box titled "Yahoo ID" and password in "Password" text box.
  - Click the mouse on "Sign In" button. When you do so, browser will display a web page, which is shown in figure 9.4.
  - Now click the mouse on "Compose" option. When you do so, a web page that facilitates you to write the letter, appears in browser window. This web page is shown in figure 9.7.

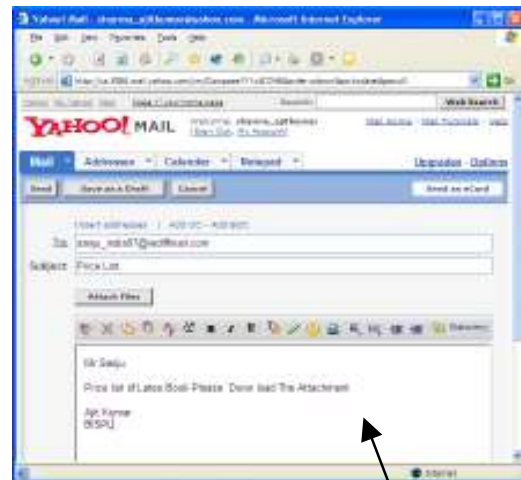


Figure 9.7

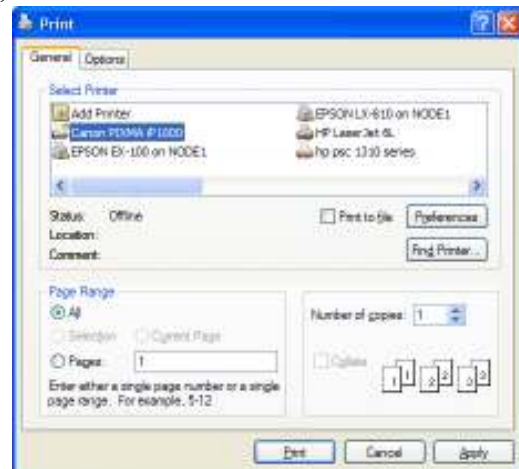
Letter  
Writing  
Area

- Now enter e-mail address of the person to whom you want to send the mail in the text box, titled "To". Type the title of the letter in the text box, named "Subject". If you wish to send the copy of the same letter to other persons also, click the mouse on "Add CC" link and enter their e-mail address in the text box named "Cc" with each address separated by a comma.
- If you wish to keep a copy of the letter with you, so that you know what was sent to whom, select "Save copy" check box.
- Now type the contents of the letter in letter writing area.
- If you wish to attach any document with your letter (that is present on your disk), click the mouse on "Attach Files" button. When you do so, you will be asked to specify the location and name of the document that you wish to attach. Specify the details, as per requirement.
- After entering the contents of the letter, click the mouse on "Send" button. This will transmit the letter to the desired address and you will get a message on your screen (in the form of a web page) that your letter has been sent.

## ASSIGNMENT -2

### (a) *Printing an E-Mail received.*

- First open the e-mail, which is to be printed. Procedure for opening the e-mail is given above. When you open the e-mail, there will be a "Printable View" link in the page.
- Click the mouse on "Printable View" link. When you do so, mail will appear, as it will be printed on the printer.
- Now select "File" option from the bar menu. When you do so, file submenu will appear on the screen.
- Select "Print" option from File submenu. When you do so, a dialog box, as shown in figure 9.8 will appear on the screen.
- Make choices as per your requirement through this dialog box and click the mouse on "Print" button.



**Figure 9.8**

### (b) *Use of Attachment Facility.*

- Prepare an e-mail along with which, other document are to be attached. When you do so, browser windows will have a web page similar to the one, which is shown in figure 9.7 Note that this web page has "Attach Files" button in it

- (ii) Click the mouse on "Attach Files" button. When you do so, a web page for attaching the files with document, will appear within the browser window. This web page is shown in figure 9.9(a)

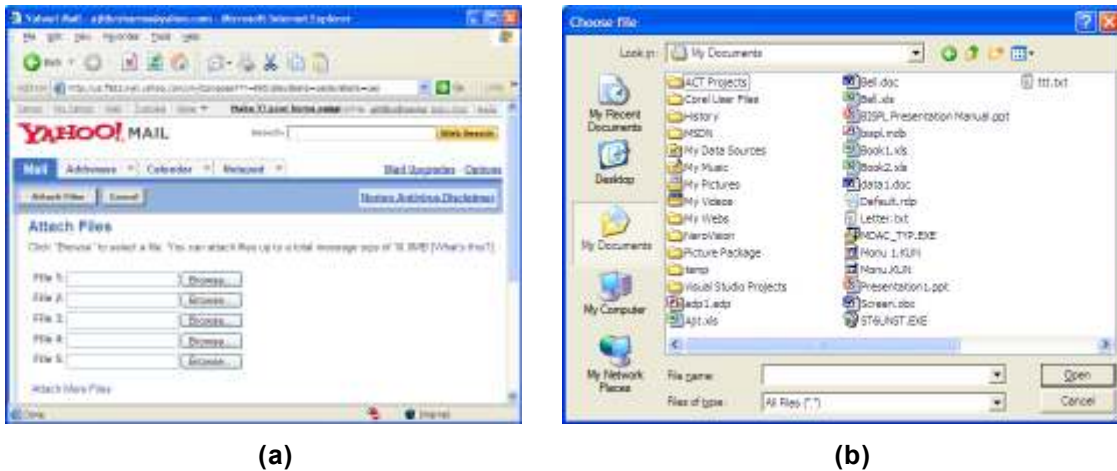


Figure 9.9

- (iii) To attach a file, click the mouse on "Browse" button. When you do so, file open dialog box, as shown in figure 9.9 (b) will appear on the screen.
- (iv) Using this dialog box, select the file that is to be attached and click the mouse on "Open" button, present in this dialog box. When you do so, you will return back to the web page shown in figure 9.9(a).
- (v) If required, attach more files, using same procedure.
- (vi) Now click the mouse on "Attach files" button. When you do so, e-mail program will convert the file into e-mail readable format and display a web page with "Continue to Message" button.
- (vii) Click the mouse on this button. When you do so you will return back to mail preparation web page, which is shown in figure 9.7.
- (viii) At last, click the mouse on "Send" button to transmit the mail.

**(c) Use of Address Book Facility.**

- (i) To make use of address book facilities, invoke e-mail service. When you do so, a web page, as shown in figure 9.6. will appear on monitor screen.
- (ii) Click the mouse on "Address" button, present in this web page. When you do so, another web page as shown in figure 9.10 will appear on the monitor screen.
- (iii) To add an address in the address book, click the mouse on "Add Contact" button. When you do so, information form will appear on the screen. To add a contact in the address book, fill the form.

- (iv) To delete a contact from the address book, check the corresponding check box and click the mouse on "Delete" button.
- (v) To send an e-mail to many persons (or one), check corresponding check boxes and click the mouse on "Send Mail" button. When you do so, web page, using which you composed e-mail will appear on the screen.
- (vi) Now send the e-mail, after preparing it.

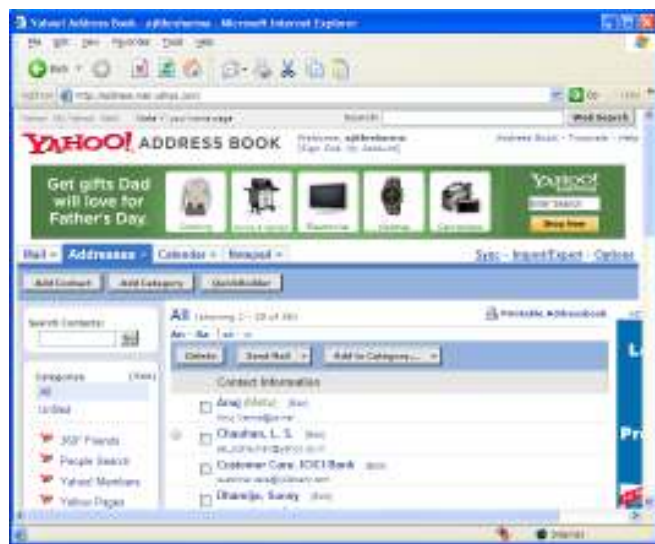


Figure 9.10

### ASSIGNMENT -3

#### (a) Use of Sent Folder

- (i) E-mail service can keep a copy of all those e-mails that you send to others. To view all these e-mails, get the web page shown in figure 9.6.
- (ii) Now click the mouse on "Sent" link. When you do so, a web page containing link to all the sent letters appears within the browser window. This page is shown in figure 9.11.

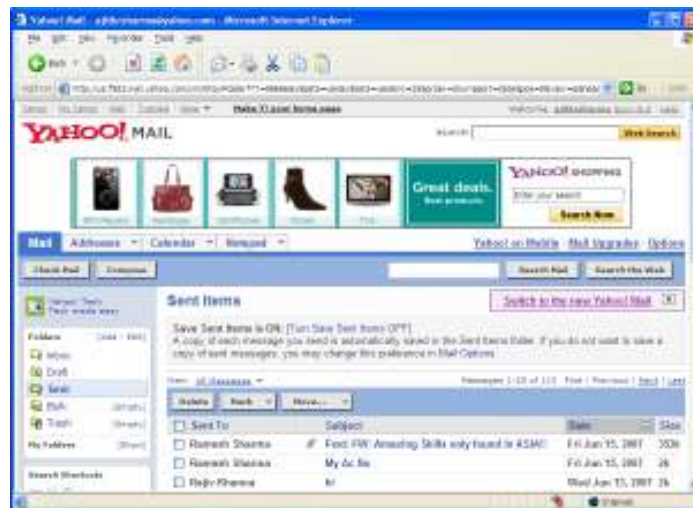


Figure 9.11



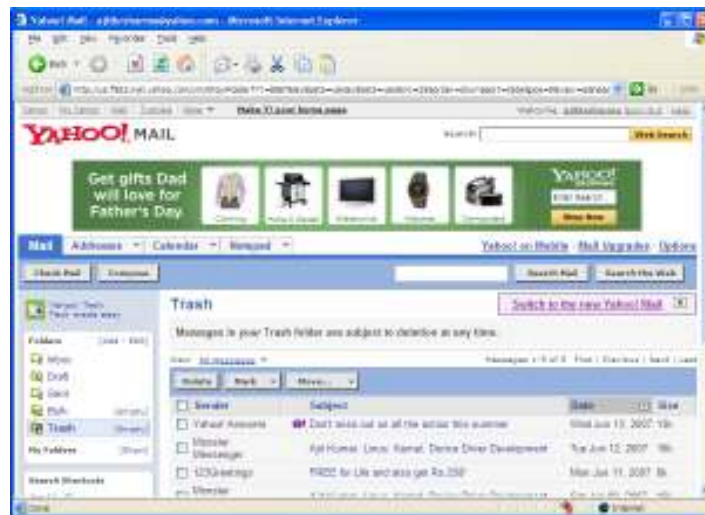
- (iii) To view the contents of the letter, click the mouse on subject of the letter.
- (iv) If you wish to turn this service off, click the mouse on "Turn Save Sent Items OFF", link present in this web page.

**(b) Use of draft folder.**

- (i) E-mail service provides facility to save the drafts of letters that you wish to send. This can be done by performing following steps:
- (ii) After composing the e-mail, click the mouse on "Save as a Draft" button. When you do so, contents of the e-mail will get saved in a folder, named "Draft"
- (iii) To make use of this draft, click the mouse on "Draft" link present on the web page. This link is shown in figure 9.6.

**(c) Use of Trash Folder**

- (i) Trash folder stores all the e-mails that you delete from your account. To view the trash folder, click the mouse on "Trash" icon. When you do so, a web page, as shown in figure 9.12 will appear on the screen.



**Figure 9.12**

- (ii) To make the trash empty click the mouse on "Empty" link.

## ASSIGNMENT -4

**(a) Browse a given web-site address.**

- (i) Perform following steps to browse the web sites.
  - Get connected to Internet
  - Invoke web browser.

- Access yahoo.com web site. Procedure for accessing a web site is given on page 109.
- Click the mouse on any link, present in the web page.
- Click the mouse on "Back" button present in browser window. This button will take you back to yahoo.com web site.
- Now click the mouse on another link, present in the web page.
- Now enter excite.com in address bar and press "Enter" key. This process will take you to another web site.
- Now right click the mouse on any link. When you do so, popup menu will appear on the screen.
- Select "Open in New Window" option. This will display web page in new window.
- Repeat above mentioned procedure for few other links, present on excite.com web site.

***(b) Search a particular topic through a search engine.***

- (i) Perform following steps to search information on given topics:
  - Get connected to Internet, if you are not connected to it.
  - Invoke web browser.
  - Go to google.com web site. It provides very popular search engine.
  - Enter "Examination Techniques" in edit box and click the mouse on "Google Search" button.
  - Access at least three links of hit list and compare the contents.
  - Go to excite.com web site.
  - Enter "Examination Technique" in edit box and click the mouse on "Search" button. When you do so, another hit list will get displayed.
  - Compare this hit list with the hit list obtained from Google. You will find some difference in them.
  - Access some of the links present in hit list.
  - Go back to yahoo.com, enter "How computer works" in search edit box and search will result into a hit list.
  - Visit some of the links of this hit list.

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## PART III

# Viva Question Bank

*(Consists of 501 questions)*

- ❑ Introduction to Computer
- ❑ Computer Organization
- ❑ Operating System
- ❑ Computer Communication
  - ❑ Windows
  - ❑ MS-Word
  - ❑ MS-Excel
  - ❑ MS-PowerPoint
  - ❑ Internet

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# Viva Question Bank

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1. What is computer?
2. What is the main function of computer?
3. What is ENIAC?
4. What is meant by generation of computers?
5. Which generation of computers used vacuum tubes?
6. Which generation of computers made use of transistors?
7. What is IC?
8. How IC is different from transistor?
9. Which generation of computer made use of ICs?
10. What is SSI?
11. What is MSI?
12. What is LSI?
13. What is VLSI?
14. Which generation of computers made use of VLSI chips?
15. Modern computers belong to which generation?
16. In what way fifth generation computers will be different from fourth generation computers?
17. Which type of computer is called analog computer?
18. Which type of computer is called digital computer?
19. Which type of computer is called hybrid computer?
20. Give two examples of analog computers.
21. Give an example of digital computer.
22. Name any two hybrid computers.
23. Which types of computers are called microcomputers?
24. Personal computers fall into which category of computers?
25. Name any two computers, which fall into the category of microcomputers.
26. What is the difference between laptop computer and tablet PC?
27. What is mainframe?
28. What is the typical characteristic of supercomputer?
29. What makes supercomputer so fast?
30. Name any two supercomputers.
31. Name any three applications, which can only be performed on supercomputers.
32. What is computer hardware?

33. What is software?
34. Is floppy, hardware or software?
35. Hard disk that contains programs on it, is hardware or software?
36. Program on CD are hardware or software?
37. Rail reservation application is hardware or software?
38. What is firmware?
39. Give an example of firmware.
40. Differentiate between system software and application software.
41. Give two examples of system software.
42. Give two examples of application software.
43. What are device drivers?
44. Device drivers fall in which category of software?
45. What is the role of boot strap program in computer?
46. Define the term, data.
47. What is information?
48. Differentiate between data and information.
49. What is computer program?
50. Give example of data and information.
51. What role does software play in computer?
52. What is operating system?
53. Can computer work without software?

## **COMPUTER ORGANIZATION**

54. Name 5 input devices of computer.
55. Name 4 output devices of computer.
56. Name 3 input-output devices.
57. What is the role of scanner in computer?
58. Which type of device is barcode reader?
59. What is MICR? What it is used for?
60. What type of device is mouse?
61. Mouse and keyboard, both are input devices, but what is the basic difference between them?
62. What is the difference between plotter and printer?
63. What is the basic difference between input units and input/output units of computer?
64. What is the basic difference between output units and input/output units of computer?

65. Among floppy, hard disk and CD, which medium possesses largest storage capacity?
66. What is the basic difference between floppy drive and hard disk?
67. What is the basic difference between CD and CD-R?
68. What is the basic difference between CD-R and CD-R/W?
69. Which type of devices are called sequential access devices?
70. Which type of devices are called random access devices?
71. Give an example of sequential access device.
72. Give an example of random access device.
73. Differentiate between the functioning of tension arm and vacuum column tape drives.
74. In which form, magnetic tape drive records data on tape drives.
75. Name all those units, which put together constitute Central Processing Unit (CPU).
76. What is the main role of memory in computer?
77. What is ROM?
78. How data is written in ROM?
79. Differentiate between PROM and EPROM.
80. Describe the role of RAM in computer?
81. Describe the role of cache memory in computer?
82. Why can't complete RAM be replaced by cache memory in computer?
83. Name the two units between which cache memory is placed within the computer.
84. Which unit in computer performs calculations?
85. What is ALU? What is its role in computer?
86. Give example of logical operations.
87. Which unit in computer performs logical operations?
88. Describe the role of Control Unit in computer.
89. Describe at least three characteristic of computer.
90. Which memory in computer is called temporary memory?
91. Which memory in computer is called permanent memory?
92. Differentiate between dot matrix printers and inkjet printers.
93. Which 4 colors are used in inkjet printers to generate other colors?
94. What is cartridge tape drive? What is its role?
95. Which unit controls data traffic within the computer?
96. Is CD drive an input unit or output unit?

## **OPERATING SYSTEM**

97. What is operating system?
98. What is the role of operating system in computer?
99. Is operating system, computer hardware or software?
100. What is booting?
101. What is process management function? Which software performs this function in computer?
102. What is memory management function? Which software performs this function in computer?
103. What is information management function? Which software performs this function in computer?
104. What is device management function? Which software performs this function?
105. What is user interface? Which software provides user interface in computers?
106. What is Command Line Interface (CLI)?
107. What is Graphic User Interface (GUI)?
108. Name at least two operating systems, which provide command line interface, for working on computer.
109. Name at least two operating systems, which provide graphic user interface for working on computer.
110. Differentiate between object icons and program icons.
111. Differentiate between check boxes and radio buttons.
112. Describe any three essential features of operating system.
113. What is distributed computing?
114. Which type of operating system is called single user operating system?
115. Name any two operating systems that are single user operating system.
116. Which type of operating system is called multi user operating system?
117. Name any two operating systems, which are multi user operating systems.
118. Describe, time sharing feature.
119. Which type of operating systems support time sharing feature?
120. Name an operating system, which supports time sharing feature.
121. Describe multitasking feature?
122. Name at least two operating systems, which support multitasking feature.
123. Name an operating system, which doesn't support multitasking feature.
124. Name an operating system that doesn't support time sharing feature.
125. Describe at least 2 characteristics of single user operating system.
126. Which type of operating system is called network operating system?



127. Name two operating systems, which are network operating systems.
128. Name three essential files of MS-DOS operating system.
129. What is the role of IO.SYS file in MS-DOS operating system?
130. Which organization designed and developed MS-DOS operating system?
131. What is the role of MSDOS.SYS file in MS-DOS operating system?
132. What is the role of COMMAND.COM file in MS-DOS operating system?
133. Which types of commands are called internal commands of MS-DOS?
134. Which file of MS-DOS contains internal commands?
135. Name any three internal commands of MS-DOS.
136. What are external commands of MS-DOS? Where do they reside?
137. Name any two external commands of MS-DOS.
138. Out of internal command and external command, which will execute faster and why?
139. How long can a file name be in MS-DOS?
140. What is directory? How it is different from file?
141. You can always have a directory within a directory. How deep can you go in this way?
142. Can a file have a directory stored in it?
143. What is root directory? Which symbol is used for denoting root directory in MS-DOS?
144. What is parent directory? Which symbol is used for denoting parent directory in MS-DOS?
145. Name any three directory related MS-DOS commands.
146. Name a command of MS-DOS, which creates a blank directory on the disk.
147. Name a command of MS-DOS, using which name of the directory could be changed.
148. Name a command, using which the name of current directory could be displayed on monitor.
149. Explain the concept of path in MS-DOS.
150. Which command will you use to display the contents of a file?
151. Which command will you execute in MS-DOS to find the presence of ABC.DAT file on disk?
152. Can you rename the files across the drivers in MS-DOS? If yes then what command will you execute?
153. What is the basic difference between SYS command and FORMAT A: /S command?
154. What are the similarities between SYS command and FORMAT A: /S command?
155. How will you delete a directory, which is not blank?

156. What are wild characters? Name any two wild card characters that are used in MS-DOS.
157. Explain drag and drop feature of Windows.
158. Explain cut, copy and paste feature of Windows.
159. Explain object embedding feature of Windows.
160. Explain object linking feature of Windows.
161. Differentiate between object embedding and object linking.
162. What are the advantages of object linking over object embedding?
163. Describe the feature plug and play of Windows.
164. What does command prompt feature do in Windows?
165. What is the use of Notepad program in Windows?
166. What is the use of WordPad program in Windows?
167. What is the use of Paint program in Windows?
168. What is the use of Windows Explorer program?
169. Which version of Windows is network operating system?
170. What is Linux? Who designed it?
171. Which command is used for viewing the names of files, present on the disk?
172. What activity is performed by who command in Linux?
173. What do you call the process of loading the operating system in computer's memory?
174. Can a computer work, without operating system?
175. Where will you find operating system in computer?
176. What is Windows NT?
177. Differentiate between Windows NT and Windows XP.
178. Differentiate between Notepad and WordPad programs of Windows.
179. How Windows file naming convention is different from MS-DOS file naming convention?
180. Can you have blank in MS-DOS file name?
181. Can you have blank in Windows file name?
182. What is folder?
183. What is folder equivalent in MS-DOS?

## **COMPUTER COMMUNICATION**

184. Define the term computer network?
185. What is the basic objective of computer network?
186. State any three reasons for computer networking.
187. Describe any three applications, which make use of computer network.

188. Describe two advantages of computer networking.
189. Describe an application, which is only possible through computer network and cannot be performed by stand alone computer.
190. What is LAN?
191. Which types of networks are called local area networks?
192. Which types of networks are called wide area networks?
193. State any two characteristics of local area network.
194. State any two characteristics of wide area network.
195. What is the basic difference between LAN and WAN?
196. What is CAN? Is it LAN or WAN?
197. What is MAN? Is it LAN or WAN?
198. What is HAN? Is it LAN or WAN?
199. What is network topology?
200. How many types of network topologies are commonly used?
201. What is the basic characteristic of Bus topology?
202. What are the advantages of Bus topology?
203. What are the disadvantages of Bus topology?
204. What is the basic characteristic of Ring topology?
205. What are the advantages of Ring topology?
206. What are the disadvantages of Ring topology?
207. What is the basic characteristic of Star topology?
208. What are the advantages of Star topology?
209. What are the disadvantages of Star topology?
210. What is the basic characteristic of Mesh topology?
211. What are the advantages of Mesh topology?
212. What are the disadvantages of Mesh topology?
213. Which topology makes use of hub for connecting the computers of the network?
214. Ten computers are to be networked together. In which topology, maximum length of wire will be used for connecting the computers?
215. Ten computers are to be networked together. In which topology, minimum length of wire will be used for connecting the computers?
216. In which topology, network expansion will be the easiest?
217. Which factor will govern the maximum number of computers that can be connected in Star topology?
218. Which topology makes use of the device called terminator?
219. Which topology makes use of the device called repeater?
220. What is the role of sender in computer network?

221. What is the role of receiver in computer network?
222. What is the role of medium in computer network?
223. What is non wired medium? Give example of it.
224. Name 3 wired medium that are used in computer networks.
225. In which wired medium data is transmitted through light?
226. Which wired medium support fastest data transfer rates?
227. What is protocol? Name any two protocols of computer network.
228. What is per-to-per network?
229. What is client server mode?
230. What system is used for identifying the computers of network?
231. What is IP address? What is it used for?
232. What is domain name? What it is used for?
233. What is DNS server? What it deals with?
234. What is SMTP? What is its use?
235. What is Telnet? What is it used for?
236. What is FTP? What is it used for?
237. What is NFS? What it deals with?
238. What is web service? How it is related with computer network?
239. Explain the role of Finger service in computer network.
240. What does Ping service do?
241. What is SAMBA? What it deals with?
242. What is OSI model? How many layers of services constitute OSI model?
243. Name the first layer of OSI model. What it deals with?
244. Name the second layer of OSI model. What it deals with?
245. Name the third layer of OSI model. What it deals with?
246. Name the fourth layer of OSI model. What it deals with?
247. Name the fifth layer of OSI model. What it deals with?
248. Name the sixth layer of OSI model. What it deals with?
249. Name the seventh layer of OSI model. What it deals with?
250. Which type of signals are called analog signals?
251. Which type of signals are called digital signals?
252. Define the term amplitude, frequency and phase for analog signal.
253. How is analog signal different from digital signal?
254. What function is performed by A to D converter?
255. What function is performed by D to A converter?
256. Explain the term damping.

257. Out of analog and digital, which signal gets damped earlier?
258. Explain the role of modem in computer network?
259. Explain the basic theory behind analog to digital conversion process.
260. What activity is performed in sampling process that is performed at the time of converting analog signal into digital signal?
261. What activity is performed in quantization process that is performed at the time of converting analog signal into digital signal?
262. What is the basic characteristic of asynchronous transmission?
263. What is the basic characteristic of synchronous transmission?
264. What is the basic characteristic of simplex mode of transmission?
265. What is the basic characteristic of half duplex mode of transmission?
266. What is the basic characteristic of full duplex mode of transmission?
267. Out of serial transmission and parallel transmission, which transmission will be faster and why?
268. Out of serial transmission and parallel transmission, which transmission suits well for long distances and why?
269. What are the advantages of transmitting data in digital form?
270. What is Internet?
271. Differentiate between Internet and World Wide Web.
272. What are web servers and web clients?
273. How computers are identified in Internet?
274. What is ARPANET?
275. Explain domain naming convention that is followed in Internet.
276. What is web page?
277. What is web site?
278. What is hyper link? How are they generally identified in web pages?
279. What is hypermedia?
280. What is TCP/IP?
281. What types of activities are performed by TCP in TCP/IP software?
282. What types of activities are performed by IP in TCP/IP software?
283. What is HTTP?
284. Which protocol is used in World Wide Web to support multimedia activities?
285. Name any two applications of Internet.
286. What is web surfing or web browsing?
287. Name any three web sites, which provide search engines.
288. State two advantages of e-mail over normal mail.
289. What is Internet shopping?

290. What mechanism is adopted for making payments over Internet?
291. How is video conferencing different from Internet telephony?
292. Why protocols are required in network communication?
293. What is search term?
294. What is hit list?
295. What is IPX/SPX? Where it is used?
296. What is NetBIOS/NetBEUI, where it is used?
297. What is HTTP? Where it is used?
298. Which types of computers generally remain connected to Internet all the 24 hours a day?
299. In which process, sampling and quantization activities are performed?
300. In which from, i.e. analog or digital, voice signal is transmitted over telephone line?
301. In which from, i.e. analog or digital, data is generated and stored within the computer?
302. In which from i.e. analog or digital, data is transmitted over telephone lines?

## **WINDOWS**

303. What is Windows?
304. Who designed and developed Windows?
305. How is Windows different from MS-DOS?
306. How will you minimize a window?
307. What happens when you minimize a window?
308. How will you restore a minimized window?
309. How will you maximize a window?
310. What happens when you maximize a window?
311. How will you restore a maximized window?
312. How will you move a window?
313. How will you increase the length of a window?
314. How will you increase the width of a window?
315. How will you increase/decrease the size of the window in proportion?
316. Using which program of Windows, will you make drawings?
317. Which program of Windows will you use for file maintenance purpose?
318. What is desktop?
319. Where on desktop, will you find system tray?
320. How do you execute a program by its name in Windows?
321. State different methods of executing programs in Windows.
322. What is task bar, where it is situated?

- 323. What is screen saver? Why it is used?
- 324. How will you create a new folder on desktop?

## **MS-WORD**

- 325. What is word processor?
- 326. What is data processing?
- 327. How is word processing different from data processing?
- 328. Name any two word processors.
- 329. Which type of activity is performed using word processor?
- 330. How do you set left margin in MS-Word?
- 331. What function is performed, using hanging indent marker of MS-Word?
- 332. What function is performed, using first line indent marker in MS-Word?
- 333. How will you set tab position in MS-Word?
- 334. Where will you find left margin and right margin indicators in MS-Word window?
- 335. How do you start a new paragraph in MS-Word?
- 336. How will you save the current document in file?
- 337. What happens if you left align a paragraph?
- 338. What happens if you right align a paragraph?
- 339. What happens if you center align a paragraph?
- 340. What happens if you justify align a paragraph?
- 341. How will you copy first three lines of the current document to some other place?
- 342. How will you move first three lines of the current document to some another place?
- 343. What is the basic difference between copy and move operation?
- 344. Which two options will you select from Edit submenu to perform copy operation?
- 345. Which two options will you select from Edit submenu to perform move operation?
- 346. What is the basic difference between number list and bullet list?
- 347. Define the term header and footer for the document.
- 348. Differentiate between hard page breaks and soft page breaks.
- 349. What is on-line spell checker? What function is performed by it?
- 350. How will you correct a wrong spelling, using on-line spell checker?
- 351. In what form does spell checker indicate that this spelling is wrong?
- 352. In what form does, grammar check indicate that this sentence is grammatically wrong?
- 353. What is Mail Merge?
- 354. Which type of activity is performed, using mail merge facility of MS-Word?
- 355. Name any three activities, which can be easily performed, using mail merge facility of MS-Word.

356. Explain the basic principle of Mail Merge operation.
357. Describe the term, main document in relation to mail merge operation.
358. Describe the term data source, in relation to mail merge operation.
359. How field names are differentiated from text in main document?
360. How is mail merge operation different from normal letter generation?
361. What extension name is assigned to MS-Word files?

## **MS-EXCEL**

362. What is worksheet?
363. What is workbook?
364. Differentiate between worksheet and workbook?
365. Name any two worksheet softwares.
366. What is MS-Excel?
367. Who designed and developed MS-Excel?
368. Which type of activities are performed using MS-Excel?
369. Name any two activities that can be performed, using MS-Excel.
370. Describe any two features of MS-Excel.
371. What is cell?
372. How are rows named in MS-Excel?
373. How are columns named in MS-Excel?
374. What does cell address E7 state?
375. How do you move from one cell to another in MS-Excel worksheet?
376. How do you move from one worksheet to another in MS-Excel?
377. How are formulae differentiated from normal text in MS-Excel?
378. How do you enter data and time values in same cell?
379. Give an example of numeric formula.
380. Give an example of logical formula.
381. Give an example of text formula.
382. What is the advantage of using formulae in workbook?
383. Which symbol is used for Range operator in MS-Excel?
384. Which symbol is used for Union operator in MS-Excel?
385. Which symbol is used for Intersection operator in MS-Excel?
386. What is the function of Range operator?
387. What is the function of Union operator?
388. What is the function of Intersection operator?
389. What is meant by cell referencing?



390. How is relative referencing done in MS-Excel?
391. Write a formula that makes use of relative referencing?
392. How absolute referencing is done in MS-Excel?
393. Write a formula that makes use of absolute referencing?
394. What is meant by mixed referencing?
395. How mixed referencing is done in MS-Excel?
396. Write a formula that makes use of mixed referencing.
397. How will you generate the series 10, 11, 12, 13, -----25 in MS-Excel?
398. How do you select cells in MS-Excel?
399. How do you modify the contents of a cell, in cell itself, not in formula bar?
400. How will you copy the contents of a cell to another cell, using drag and drop method?
401. How will you copy the contents of a cell to another cell, using cut, copy, and paste method?
402. How will you move the contents of a cell to another cell, using drag and drop method?
403. How will you move the contents of a cell to another cell, using cut, copy and paste method?
404. Cell E5 contains a formula =SUM (E1:E4). What will be the contents of cell E6, when you copy the formula from E5 to E6?
405. Cell E5 contains a formula =SUM (\$E1:\$E4). What will be the contents of cell E6, when you copy the formula from E5 to E6?
406. Cell E5 contains a formula =SUM (\$E1:\$E4). What will be the contents of cell E7, when you copy the formula from E5 to E7?
407. Cell E5 contains a formula =SUM (\$E\$1:\$E\$4). What will be the contents of cell E6, when you copy the formula from E5 to E6?
408. Cell E5 contains a formula =SUM (\$E\$1:\$E\$4). What will the contents of cell E7, when you copy the formula from E5 to E7?
409. If you do not set alignment for cells, how will numbers, labels and formulae get aligned, when you enter them in the cells?
410. What is function in reference to MS-Excel? How it is different from the formula that we define?
411. What will you get in cell C5, if you enter the formula =LEN ("DELHI") in it?
412. What will you get in cell C5, if you enter the formula =LEFT ("LUCKNOW",4) in it?
413. What will you get in cell C5, if you enter the formula =UPPER ("How Are You") in it?
414. What will you get in cell C5, if you enter the formula =REPT ("\*",10) in it?
415. Which option will you select from bar menu to print the worksheet?
416. What is chart? What are its advantages?
417. Name any 5 charts that can be made in MS-Excel.

418. Name any 2 charts of MS-Excel that are circular in shapes.
419. What is the basic difference between Pie chart and Doughnut chart?
420. What is the basic difference between Column chart and Bar chart?
421. What is the basic difference between Line chart and XY chart?
422. What will happen to the data in worksheet, if you select a column of the column chart and drag it upwards?
423. How will you select the legend of the chart?
424. Which chart will you plot, to illustrate and compare the sales figures of three companies for three quarters of the year?
425. Which chart will you plot to illustrate the percentage wise contribution of five religions in the total population of the city?
426. How will you delete a chart?
427. How will you copy a chart from one worksheet to other worksheet of the same workbook?
428. Which chart will you plot to illustrate the rainfall that took place in last 12 months in Chennai?
429. What is data series? Give an example.
430. What is legend? What is its role in chart?

## **POWER POINT**

431. What is PowerPoint?
432. Who designed and developed PowerPoint?
433. What is presentation?
434. For which type of activities PowerPoint suits well?
435. What is PowerPoint slide?
436. Differentiate between manual presentation and PowerPoint presentation.
437. Name any four elements that can be included in PowerPoint slides.
438. What is slide show?
439. Differentiate between manual slide show and automatic slide show.
440. What is the purpose of including notes in the slides of the presentation?
441. What is slide timing?
442. In which type of slide show, slide timings become effective?
443. How the slides of the presentation advance, in automatic slide shows?
444. How the slides of the presentation advance, in manual slide shows?
445. What happens when you switchover from current view mode to slide sorter view mode?
446. What happens, when you switchover from slide sorter view mode to normal view mode?

- 447. How do you switchover from one view mode to another in PowerPoint?
- 448. What is WordArt? What type of activities are performed using WordArt?
- 449. Differentiate between video and animation?
- 450. What is transition effect?

## **INTERNET**

- 451. What is Internet?
- 452. How Internet is different from computer network?
- 453. What is the basic objective of Internet?
- 454. Which types of computers remain connected to Internet all the 24 hours a day?
- 455. What do you call those computers, which only acquire services from web servers?
- 456. What is the basic function of web server in Internet?
- 457. What is basic function of web client in Internet?
- 458. How are web servers different from web clients?
- 459. What is www? How it is related to Internet?
- 460. What is e-mail?
- 461. Is it necessary that person to whom e-mail is being sent should have an e-mail account?
- 462. What does ".com" in website name indicate?
- 463. What does ".in" in website name indicate?
- 464. What is yahoo.com?
- 465. What is google.com?
- 466. What is search engine?
- 467. Name any three websites, which provide search facility.
- 468. Why two search engines produce two different results for same search term?
- 469. What is web browsing? Is it different from web surfing?
- 470. What is web browser?
- 471. Name any three famous web browsers.
- 472. When does "Forward" button of your web browser become activated?
- 473. What is the use of "Back" button, present in browser window?
- 474. Which software is required for web surfing?
- 475. What is the use of Draft folder that you have in your e-mail account?
- 476. What is the use of Inbox folder that you have in your e-mail account?
- 477. What is the use of Trash folder that you have in your e-mail account?
- 478. What is the use of Sent folder that you have in your e-mail account?
- 479. How is Chat service different from Internet telephony?
- 480. Name any two websites, which provide e-mail facility.

481. Describe two advantages of Internet.
482. Name any five services of Internet.
483. What is the basic difference between IP address and domain name?
484. How many groups of numbers constitute IP address?
485. Why domain name is preferred over IP address in most of the Internet operations?
486. Name the service, which transforms domain name into corresponding IP address.
487. Is Internet LAN, WAN or MAN?
488. Name any two protocols that are closely associated with Internet or World Wide Web.
489. What is the relationship between web page and website?
490. What is HTML?
491. What is HTTP?
492. Describe the advantages of hyperlink.
493. What is the basic advantage of Internet telephony?
494. Differentiate between hyperlink and hypermedia?
495. Name two Indian web sites.
496. What is ISP?
497. What is gateway?
498. Explain the term, backbone in reference to Internet.
499. What is Internet2?
500. Which additional device would be required to connect your computer to Internet?
501. What is the future Internet?

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