GOVERNMENT OF TAMILNADU

COMPUTER TECHNOLOGY

HIGHER SECONDARY FIRST YEAR

VOLUME-I

Untouchability is Inhuman and a Crime

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PREFACE

Human civilization achieved the highest peak with the development of computer known as "Computer era". Literate are those who have the knowledge in using the computer whereas others are considered illiterate inspite of the other degrees obtained.

The growth of the nation at present lies in the hands of the youth, hence the content of this book is prepared in such a way so as to attain utmost knowledge considering the future needs of the youth.

HOW TO USE THE BOOK

- This book does not require prior knowledge in computer Technology

- Each unit comprises of simple activities and demonstrations which can be done by the teacher and also students.

- Technical terminologies are listed in glossary for easy understanding

- The " Do you know?" boxes enrich the knowledge of reader with additional information

- Workshops are introduced to solve the exercises using software applications

- QR codes are used to link supporting additional

- materials in digital form

How to get connected to QR Code?

o   Download the QR code scanner from the google play store/ apple app store into your smartphone

o   Open the QR code scanner application

o   Once the scanner button in the application is clicked, camera opens and then bring it closer to the QR code in the textbook.

o   Once the camera detects the QR code, a URL appears in the screen. Click the URL and go to the content page.

TN_QR_ENG

CAREER GUIDANCE AFTER 12ᵀᴴ

COURSES	COLLEGES/ UNIVERSITIES	PROFESSION
B.E / B.Tech	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Software Engineer, Hardware Engineer, Software Development, Healthcare Section, IT & ITEs
Science and Humanities		
B.Sc (Computer Science) BCA B.Sc (Maths, Physics, Chemistry, Bio-Chemistry, Geography, journalism, Library Sciences, Political Science, Travel and Tourism)	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Government Job and Private Company BPO, Geologist, Journalist
LAW		
LLB B.A+LLB B.Com BBM+LLB BBA+LLB	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Lawyer, Legal Officer, Govt Job
CA	The Institute of Chartered Accountant of India (ICAI)	CA Private and Govt.
Diploma	Government Polytechnic and Self-financing colleges	Junior Engineer (Government and Private)
Commerce Courses		
B.com-Regular, B.com-Taxation & Tax Procedure, B.com-Travel &Tourism, B.com-Bank Management, B.com-Professional, BBA/BBM-Regular, BFM- Bachelors in Financial Markets, BMS-Bachelors in Management Studies, BAF- Bachelors in Accounting & Finance, Certified Stock Broker & Investment Analysis, Certified Financial Analyst, Certified Financial Planner, Certified Investment Banker	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Private Organization , Government ,Banking sectors and prospects for self – employment.

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COURSES	COLLEGES/ UNIVERSITIES	PROFESSION
Management Courses		
Business Management Bank Management Event Management Hospital Management Human Resource Management Logistics Management	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Private Organization , Government ,Banking sectors and prospects for self – employment.
LAW		
LLB B.A+LLB B.Com BBM+LLB BBA+LLB	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Lawyer, Legal Officer, Private Organization , Government, Banking sectors and prospects for self – employment
CA-Chartered Accountant CMA-Cost Management Accountant. CS-Company Secretary (Foundation)	The Institute of Chartered Accountant of India (ICAI)	CA, Private Organization, Government ,Banking sectors and prospects for self – employment.
Science and Humanities		
B.Sc.Botany B.Sc.Zoology B.Sc.Dietician & Nutritionist B.Sc.Home Science B.Sc.Food Technology B.Sc.Dairy Technology B.Sc. Hotel Management B.Sc. Fashion Design B.Sc. Mass Communication B.Sc. Multimedia B.Sc. -3D Animation	All University and their affiliated Colleges and Self financing Colleges in India and Abroad	Government Job and Private Company BPO, Geologist, Journalist
LAW		
LLB B.A+LLB B.Com BBM+LLB BBA+LLB	All University and their affiliated Colleges and Self financing Colleges in India and Abroad.	Lawyer, Legal Officer, Govt Job
CA	The Institute of Chartered Accountant of India (ICAI)	CA Private and Govt.
Diploma	Government Polytechnic and Self-financing colleges	Junior Engineer (Government and Private)

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Table of Contents

E - book   Assessment   DIGI links

Introduction to Computers

Learning Objectives

After learning the concepts in this chapter, the students will be able

- To know about Computers

- To learn about various generations of computer

- To understand the basic operations of computers

- To know the components and their functions.

- To know about booting of a computer

Father of Computer

DO YOU KNOW?

Charles Babbage is considered to be the father of computer, for his invention and the concept of Analytical Engine in 1837. The Analytical Engine contained an Arithmetic Logic Unit (ALU), basic flow control, and integrated memory; which led to the development of first general-purpose computer concept.

CNUSHU

1.1 Introduction to Computers

Computers are seen everywhere around us, in all spheres of life, in the field of education, research, travel and tourism, weather forecasting, social networking, e-commerce etc. Computers have now become an indispensable part of our lives. Computers have revolutionized our lives with their accuracy and speed of performing a job, it is truly remarkable. Today, no organization can function without a computer. In fact, various organizations have become paperless. Computers have evolved over the years from a simple calculating device to high speed portable computers.

The growth of computer industry started with the need for performing fast calculations. The manual method of computing was slow and prone to errors. So, attempts were made to develop fast calculating devices, the journey started from the first known calculating device (Abacus) which has led us today to an extremely high speed calculating devices.

1.2 Generations of Computers

Growth in the computer industry is determined by the development in technology.

Based on various stages of development, computers can be categroized into different generations.

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SN	Generation	Period	Main Component used	Merits/Demerits
1	**First Generation**	1942-1955	**Vacuum tubes**	• Big in size • Consumed more power • Malfunction due to overheat • Machine Language was used
First Generation Computers - ENIAC , EDVAC , UNIVAC 1 ENIAC weighed about 27 tons, size 8 feet × 100 feet × 3 feet and consumed around 150 watts of power				
2	**Second Generation**	1955-1964	**Transistors**	• Smaller compared to First Generation • Generated Less Heat • Consumed less power compared to first generation • Punched cards were used • First operating system was developed - Batch Processing and Multiprogramming Operating System • Machine language as well as Assembly language was used.
Second Generation Computers **IBM 1401, IBM 1620, UNIVAC 1108**				
3	**Third Generation**	1964 -1975	**Integrated Circuits (IC)**	• Computers were smaller, faster and more reliable • Consumed less power • High Level Languages were used
Third Generation Computers **IBM 360 series, Honeywell 6000 series**				
4	**Fourth Generation**	1975-1980	**Microprocessor** Very Large Scale Integrated Circuits (VLSI)	• Smaller and Faster • Microcomputer series such as IBM and APPLE were developed • Portable Computers were introduced.

5	**Fifth Generation**	1980 - till date	**Ultra Large Scale Integration (ULSI)**	• Parallel Processing • Super conductors • Computers size was drastically reduced. • Can recognize Images and Graphics • Introduction of Artificial Intelligence and Expert Systems • Able to solve high complex problems including decision making and logical reasoning
6	**Sixth Generation**	In future		• Parallel and Distributed computing • Computers have become smarter, faster and smaller • Development of robotics • Natural Language Processing • Development of Voice Recognition Software

Table1.1 Generations of computers

The first digital computer

The ENIAC (Electronic Numerical Integrator And Calculator) was invented by J. Presper Eckert and John Mauchly at the University of Pennsylvania and began construction in 1943 and was not completed until 1946. It occupied about 1,800 square feet and used about 18,000 vacuum tubes, weighing almost 50 tons. ENIAC was the first digital computer because it was fully functional.

1.3 Sixth Generation Computing

In the Sixth Generation, computers could be defined as the era of intelligent computers, based on Artificial Neural Networks. One of the most dramatic changes in the sixth generation will be the explosive growth of Wide Area Networking. Natural Language Processing (NLP) is a component of Artificial Intelligence (AI). It provides the ability to develop the computer program to understand human language.

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Optical Character Recognition (Optical Grapheme Recognition) engine for the Indus Scripts has been developed using Deep Learning Neural Networks (a sub-field of Artificial Intelligence).

Given photographs, scans, or any image feed of an Indus Valley Civilization artifact, the system will be able to recognize the inscriptions (the symbol/grapheme sequences) from the image. There are totally 417 Symbols/Graphemes/Characters in the Indus Scripts and just 3700+ text inscriptions of data for the machine to learn and attain expert-level status.

and even playing games.

Computer - man or machine?

Before 19th century, the term "Computer" was referred to humans who performed calculations using Abacus and Slide Rule and not to machine.

The term "computer" is derived from the word "compute" which means to calculate. The person who performs calculation is called as Computer. This term was later given to mechanical device as they began replacing the human computers.

Today's computers are electronic devices that accept data as input, process it, produce output and stores it for future reference.

I am a good Computer
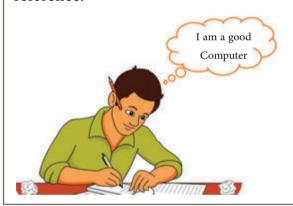
1.4. Data and Information

We all know what a computer is? It is an electronic device that processes the input according to the set of instructions provided to it and gives the desired output at a very fast rate. Computers are very versatile as they do a lot of different tasks such as storing data, weather forecasting, booking airlines, railway or movie tickets

Data: Data is defined as an un-processed collection of raw facts, suitable for communication, interpretation or processing.

For example, 134, 16 'Kavitha', 'C' are data. This will not give any meaningful message.

Information: Information is a collection of facts from which conclusions may be drawn. In simple words we can say

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that data is the raw facts that is processed to give meaningful, ordered or structured information. For example Kavitha is 16 years old. This information is about Kavitha and conveys some meaning. This conversion of data into information is called data processing.
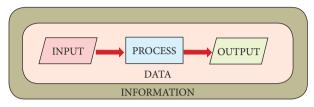

Figure 1.1 Data and Information

"A Computer is an electronic device that takes raw data (unprocessed) as an input from the user and processes it under the control of a set of instructions (called program), produces a result (output), and saves it for future use."

1.5 Components of a Computer

The computer is the combination of hardware and software. Hardware is the physical component of a computer like motherboard, memory devices, monitor, keyboard etc., while software is the set of programs or instructions. Both hardware and software together make the computer system to function.

Figure 1.2: Computer

Let us first have a look at the functional components of a computer. Every task given to a computer follows an Input- Process- Output Cycle (IPO cycle). It needs certain input, processes that input and produces the desired output. The input unit takes the input, the central processing unit does the processing of data and the output unit produces the output. The memory unit holds the data and instructions during the processing.
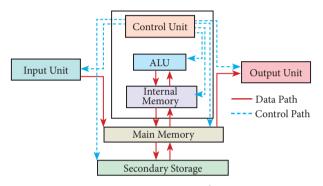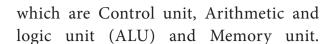

Figure 1.3 components of a computer

1.5.1 Input Unit

Input unit is used to feed any form of data to the computer, which can be stored in the memory unit for further processing. Example: Keyboard, mouse, etc.

1.5.2 Central Processing Unit

CPU is the major component which interprets and executes software instructions. It also control the operation of all other components such as memory, input and output units. It accepts binary data as input, process the data according to the instructions and provide the result as output.

The CPU has three components

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which are Control unit, Arithmetic and logic unit (ALU) and Memory unit.

1.5.2.1 Arithmetic and Logic Unit

The ALU is a part of the CPU where various computing functions are performed on data. The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations. The result of an operation is stored in internal memory of CPU. The logical operations of ALU promote the decision-making ability of a computer.

1.5.2.2 Control Unit

The control unit controls the flow of data between the CPU, memory and I/O devices. It also controls the entire operation of a computer.

1.5.3. Output Unit

An Output Unit is any hardware component that conveys information to users in an understandable form. Example: Monitor, Printer etc.

1.5.4. Memory Unit

The Memory Unit is of two types which are primary memory and secondary memory. The primary memory is used to temporarily store the programs and data when the instructions are ready to execute. The secondary memory is used to store the data permanently.

The Primary Memory is volatile, that is, the content is lost when the power supply is switched off. The Random Access Memory (RAM) is an example of a main memory. The Secondary memory is non volatile, that is, the content is available even after the power supply is switched off. Hard disk, CD-ROM and DVD ROM are examples of secondary memory.

1.5.5. Input and Output Devices

Input Devices:

(1) Keyboard: Keyboard (wired / wireless, virtual) is the most common input device used today. The individual keys for letters, numbers and special characters are collectively known as character keys. This keyboard layout is derived from the keyboard of original typewriter. The data and instructions are given as input to the computer by typing on the keyboard. Apart from alphabet and numeric keys, it also has Function keys for performing different functions. There are different set of keys available in the keyboard such as character keys, modifier keys, system and GUI keys, enter and editing keys, function keys, navigation keys, numeric keypad and lock keys.

Figure 1.4 Keyboard

(2) Mouse: Mouse (wired/wireless) is a pointing device used to control the movement of the cursor on the display screen. It can be used to select icons, menus, command buttons or activate something on a computer. Some mouse
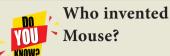
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actions are move, click, double click, right click, drag and drop.

Different types of mouse available are: Mechanical Mouse, Optical, Laser Mouse, Air Mouse, 3D Mouse, Tactile Mouse, Ergonomic Mouse and Gaming Mouse.

MOST COMMONLY USED TYPES OF MOUSE			
SN	Type of Mouse	Mechanism	Developed and Introduced
1	**Mechanical Mouse**	• A small ball is kept inside and touches the pad through a hole at the bottom of the mouse. • When the mouse is moved, the ball rolls. • This movement of the ball is converted into signals and sent to the computer.	Telefunken, German Company, 02/10/1968
2	**Optical Mouse**	• Measures the motion and acceleration of pointer. • It uses light source instead of ball to judge the motion of the pointer. • Optical mouse has three buttons. • Optical mouse is less sensitive towards surface.	• In 1988, Richard Lyon, Steve Krish independently invented different versions of Optical Mouse.
3	**Laser Mouse**	• Measures the motion and acceleration of pointer. • Laser Mouse uses Laser Light • Laser Mouse is highly sensitive and able to work on any hard surface.	

Table 1.2 Commonly used Mouse

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(3) Scanner: Scanners are used to enter the information directly into the computer's memory. This device works like a Xerox machine. The scanner converts any type of printed or written information including photographs into a digital format, which can be manipulated by the computer.

Figure 1.5 Scanner

(4)Fingerprint Scanner: Finger print Scanner is a fingerprint recognition device used for computer security, equipped with the fingerprint recognition feature that uses biometric technology. Fingerprint Reader / Scanner is a very safe and convenient device for security instead of using passwords, which is vulnerable to fraud and is hard to remember.

Figure 1.6 Fingerprint Scanner

(5) Track Ball: Track ball is similar to the upside- down design of the mouse. The user moves the ball directly, while the device itself remains stationary. The user spins the ball in various directions to navigate the screen movements.

Figure 1.7 Track Ball

(6) Retinal Scanner: This performs a retinal scan which is a biometric technique that uses unique patterns on a person's retinal blood vessels.

Figure 1.8 Retinal Scanner

(7) Light Pen: A light pen is a pointing device shaped like a pen and is connected to

a monitor. The tip of the light pen contains a light-sensitive element which detects the light from the screen enabling the computer to identify the location of the pen on the screen. Light pens have the advantage of 'drawing' directly onto the screen, but this becomes hard to use, and is also not accurate.

Figure 1.9 Light Pen

(8) Optical Character Reader: It is a device which detects characters printed or written on a paper with OCR, a user can scan a page from a book. The Computer will recognize the characters in the page as letters and punctuation marks and stores. The Scanned document can be edited using a wordprocessor.

Figure 1.10 Optical Character Reader

(9) Bar Code / QR Code Reader: A Bar code is a pattern printed in lines of different thickness. The Bar code reader

scans the information on the bar codes transmits to the Computer for further processing. The system gives fast and error free entry of information into the computer.
       QR (Quick response) Code: The QR code is the two dimension bar code which can be read by a camera and processed to interpert the image

Figure 1.11 Bar code Reader

(10)   Voice   Input   Systems: Microphone   serves   as   a   voice   Input device. It captures the voice data and send it to the Computer. Using the microphone along with speech recognition software can offer a completely   new approach to input   information   into   the   Computer.

Figure 1.12 Voice input System

(11) Digital Camera: It captures images / videos directly in the digital form. It uses a CCD (Charge Coupled Device) electronic chip. When light falls on the chip through the lens, it converts light rays into digital format.

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Figure 1.13 Digital Camera

(12) Touch Screen: A touch screen is a display device that allows the user to interact with a computer by using the finger. It can be quite useful as an alternative to a mouse or keyboard for navigating a Graphical User Interface (GUI). Touch screens are used on a wide variety of devices such as computers, laptops, monitors, smart phones, tablets, cash registers and information kiosks. Some touch screens use a grid of infrared beams to sense the presence of a finger instead of utilizing touch-sensitive input.

Figure 1.14 Touch Screen

(13) Keyer : A Keyer is a device for signaling by hand, by way of pressing one or more switches. Modern keyers have a large number of switches but not as many as a full size keyboard. Typically, this number is between 4 and 50. A keyer differs from a keyboard, which has "no board", but the keys are arranged in a cluster.
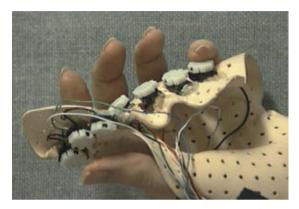

Figure 1.15 Keyer

Output Devices:

(1) Monitor: Monitor is the most commonly used output device to display the information. It looks like a TV. Pictures on a monitor are formed with picture elements called PIXELS. Monitors may either be Monochrome which display text or images in Black and White or can be color, which display results in multiple colors. There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes). The monitor works with the VGA (Video Graphics Array) card. The video graphics card helps the keyboard to communicate with the screen. It acts as an interface between the computer and display monitor. Usually the recent motherboards incorporate built-in video card.

The first computer monitor was part of the Xerox Alto computer system, which was released on March 1, 1973.

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Figure 1.16 Monitor

(2) Plotter: Plotter is an output device that is used to produce graphical output on papers. It uses single color or multi color pens to draw pictures.

Figure 1.17 Plotter

(3) Printers: Printers are used to print the information on papers. Printers are divided into two main categories:

- Impact Printers

- Non Impact printers

Impact Printers

These printers print with striking of hammers or pins on ribbon. These printers can print on multi-part (using carbon papers) by using mechanical pressure. For example, Dot Matrix printers and Line matrix printers are impact printers.

A Dot matrix printer that prints using a fixed number of pins or wires. Each dot is produced by a tiny metal rod, also called a "wire" or "pin", which works by the power of a tiny electromagnet or solenoid, either directly or through a set of small levers. It generally prints one line of text at a time. The printing speed of these printers varies from 30 to 1550 CPS (Character Per Second).

Figure 1.18 Impact Printer

Line matrix printers use a fixed print head for printing. Basically, it prints a page-wide line of dots. But it builds up a line of text by printing lines of dots. Line printers are capable of printing much more than 1000 Lines Per Minute, resulting in thousands of pages per hour. These printers also uses mechanical pressure to print on multi-part (using carbon papers).

Non-Impact Printers

These printers do not use striking mechanism for printing. They use electrostatic or laser technology. Quality and speed of these printers are better than Impact printers. For example, Laser printers and Inkjet printers are non-impact printers.

Laser Printers

Laser printers mostly work with similar technology used by photocopiers. It makes a laser beam scan back and

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forth across a drum inside the printer, building up a pattern. It can produce very good quality of graphic images. One of the chief characteristics of laser printer is their resolution – how many Dots per inch(DPI). The available resolution range around 1200 dpi. Approximately it can print 100 pages per minute(PPM)

Figure 1.19 Laser Printer

Inkjet Printers:

Inkjet Printers use colour cartridges which combined Magenta, Yellow and Cyan inks to create color tones. A black cartridge is also used for monochrome output. Inkjet printers work by spraying ionised ink at a sheet of paper. The speed of Inkjet printers generaly range from 1-20 PPM (Page Per Minute).

Figure 1.20 Inkjet Printer

They use the technology of firing ink by heating it so that it explodes towards the paper in bubbles or by using piezoelectricity in which tiny electric currents controlled by electronic circuits are used inside the printer to spread ink in jet speed. An Inkjet printer can spread millions of dots of ink at the paper every single second.

Speakers: Speakers produce voice output (audio) . Using speaker along with speech synthesize software, the computer can provide voice output. This has become very common in places like airlines, schools, banks, railway stations, etc..

Figure 1.21 Speakers

Multimedia Projectors:

Multimedia projectors are used to produce computer output on a big screen. These are used to display presentations in meeting halls or in classrooms.

Figure 1.22 Multimedia Projector

1.6 Booting of computer

An Operating system (OS) is a basic software that makes the computer

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to work. When a computer is switched on, there is no information in its RAM. At the same time, in ROM, the pre-written program called POST (Power on Self Test) will be executed first. This program checks if the devices like RAM, keyboard, etc., are connected properly and ready to operate. If these devices are ready, then the BIOS (Basic Input Output System) gets executed. This process is called Booting. Thereafter, a program called "Bootstrap Loader" transfers OS from hard disk into main memory. Now the OS gets loaded (Windows/Linux, etc.,) and will get executed. Booting process is of two types.

1) Cold Booting

2) Warm Booting

Cold Booting: When the system starts from initial state i.e. it is switched on, we call it cold booting or Hard Booting. When the user presses the Power button, the instructions are read from the ROM to initiate the booting process.

Warm Booting: When the system restarts or when Reset button is pressed, we call it Warm Booting or Soft Booting. The system does not start from initial state and so all diagnostic tests need not be carried out in this case. There are chances of data loss and system damage as the data might not have been stored properly.

Points to Remember:

- Computers are seen everywhere around us, in all spheres of life.

- It is an electronic device that processes the input according to the set of instructions provided to it and gives the desired output at a very fast rate.

- Based on various stages of development, computers can be divided into six different generations.

- The computer is the combination of hardware and software.

- Hardware is the physical component of a computer.

- Input unit is used to feed any form of data to the computer.

- CPU interprets and executes software instructions.

- The ALU is a part of the CPU where various computing functions are performed on data.

- The control unit controls the flow of data between the CPU, memory and I/O devices.

- An Output Unit is any hardware component that conveys information to one or more people in user understandable form.

- The Memory Unit is of two kinds which are primary memory and secondary memory.

- Booting Process is of two types – Cold and Warm

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STUDENT ACTIVITY

1. Explain the classification of computers.

2. Give the details of motherboard names, RAM capacity used in the years 1993, 1995, 2005, 2008, 2016.

3. Mention two new input and output devices that are not given in this chapter.

TEACHER ACTIVITY

1. Open a CPU and explain the components of it to students.

2. To connect and disconnect the various components of a computer.

Evaluation

SECTION – A

Choose the correct answer:

1. First generation computers used

   (a) Vacuum tubes   (b) Transistors

   (c) Integrated circuits   (d) Microprocessors

2. Name the volatile memory

   (a) ROM   (b) PROM   (c) RAM   (d) EPROM

3. Identify the output device

   (a) Keyboard   (b) Memory   (c) Monitor   (d) Mouse

4. Identify the input device

   (a) Printer   (b) Mouse   (c) Plotter   (d) Projector

5. …………… Output device is used for printing building plan, flex board, etc.

   (a) Thermal printer   (b) Plotter

   (c) Dot matrix   (d) inkjet printer

6. In ATM machines, which one of the following is used to

(a) Touch Screen   (b) speaker

(c) Monitor   (d) Printer

7. When a system restarts ……………….. which type of booting is used.

(a) Warm booting   (b) Cold booting

(c) Touch boot   (d) Real boot.

8. Expand POST

(a) Post on self Test   (b) Power on Software Test

c) Power on Self Test   (d) Power on Self Text

9. Which one of the following is the main memory?

(a) ROM   (b) RAM

(c) Flash drive   (d) Hard disk

10. Which generation of computer used IC's?

(a) First   (b) Second

(c) Third   (d) Fourth

SECTION-B

Short Answers

1. What is a computer?

2. Distinguish between data and information.

3. What are the components of a CPU?

4. What is the function of an ALU?

5. Write the functions of control unit.

6. What is the function of memory?

7. Differentiate Input and output unit.

8. Distinguish Primary and Secondary memory.

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SECTION-C

Explain in Brief

1. What are the characteristics of a computer?

2. Write the applications of computer.

3. What is an input device? Give two examples.

4. Name any three output devices.

5. Differentiate optical and Laser mouse

6. Write shortnote on impact printer

7. Write the characteristics of sixth generation.

8. Write the significant features of monitor.

SECTION - D

Explain in detail

1. Explain the basic components of a computer with a neat diagram.

2. Discuss the various generations of computers.

3. Explain the following

   a. Inkjet Printer   b. Multimedia projector   c. Bar code / QR code Reader

References

(1) Fundamentals of Computers – V. Rajaraman – PHI Publications

(2) Computer Science text book – NCERT, New Delhi

Internet Resources

(1) www.wikipedia.org

(2) https://www.computerhope.com/jargon/c/computer.htm

CASE STUDY

Prepare a comparative study of various computers of past and present with respect to speed, memory, size, power consumption and other features

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CPWBPF

Computer	It is an electronic device that processes the input according to the set of instructions provided to it and gives the desired output at a very fast rate.
Vacuum tube	Vacuum tubes contain electrodes for controlling electron flow and were used in early computers as a switch or an amplifier.
Transistors	The transistor ("transfer resistance") is made up of semi-conductors. It is a component used to control the amount of current or voltage used for amplification/modulation of an electronic signal.
Punched cards	Punch cards also known as Hollerith cards are paper cards containing several punched or perforated holes that were punched by hand or machine to represent data.
Machine Language	Machine language is a collection of binary digits or bits that the computer reads and interprets.
Assembly language	An assembly language is a low-level programming language.
Integrated Circuits	The IC is a package containing many circuits, pathways, transistors, and other electronic components all working together to perform a particular function or a series of functions.
Microcomputer	Micro computer is used to describe a standard personal computer.
High-level languages	A high-level language is a computer programming language that isn't limited by the computer, designed for a specific job, and is easier to understand.
Natural Language Processing (NLP)	Natural Language Processing is a method used in artificial intelligence to process and derive meaning from the human language.
Robotics	Robot is a term coined by Karel Capek in the 1921 to play RUR (Rossum's Universal Robots). It is used to describe a computerized machine designed to respond to input received manually or from its surroundings.
Nanotechnology	Nanotechnology is an engineering, science, and technology that develops machines or works with one atom or one molecule that is 100 nanometers or smaller.
Bioengineering	A discipline that applies engineering principles of design and analysis to biological systems and biomedical technologies

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CHAPTER **2**

Number Systems

Learning Objectives

- To know how the computer interprets and stores data in the memory.

- To learn various data representations and binary arithmetic.

- To learn conversion between various Number Systems.

2.1 Introduction

The term data comes from the word **datum**, which means a raw fact. The data is a fact about people, places or some objects.

Example:

Let 'Name', 'Age', 'Class', 'Marks' and 'Subject' be some defined variables. Now, let us assign a value to each of these variables.

Name	=	Rajesh
Age	=	16
Class	=	XI
Mark	=	65
Subject	=	Computer Science

Figure 2.1 Example for Data

In the above example, the values assigned to the five different variables

are called **data**. When the above data is processed, we get an information "Rajesh is 16 years old, studying in Class XI, has scored 65 marks in Computer Science subject".

2.2 Data Representations

Computer handles data in the form of '0'(Zero) and '1' (One). Any kind of data like number, alphabet, special character should be converted to '0' or '1' which can be understood by the Computer. '0' and '1' that the Computer can understand is called **Machine language**. '0' or '1' are called '**Bi**nary Digi**t**s'(BIT). Therefore, the study of data representation in the computer is important.

- A **bit** is the short form of **Binary digit** which can be '0' or '1'. It is the basic unit of data in computers.

- A **nibble** is a collection of 4 bits (Binary digits).

- A collection of 8 bits is called **Byte**. A byte is considered as the basic unit of measuring the memory size in the computer.

- **Word length** refers to the number of bits processed by a Computer's CPU. For example, a word length can have 8 bits, 16 bits, 32 bits and 64 bits (Present day Computers use 32 bits or 64 bits)
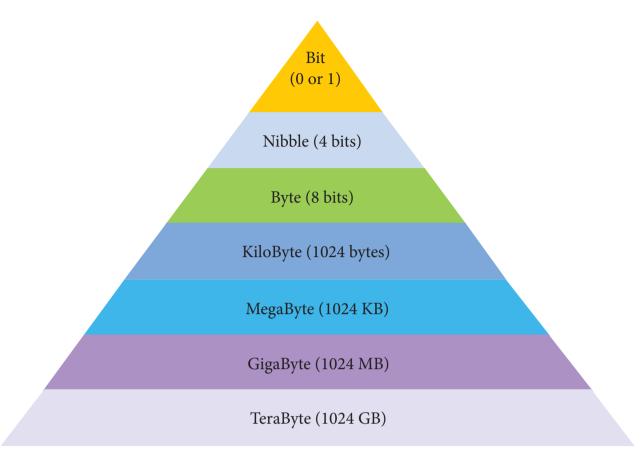
Figure 2.2 Data Representation

Computer memory (Main Memory and Secondary Storage)is normally represented in terms of KiloByte (KB) or MegaByte (MB). In decimal system, 1 Kilo represents 1000, that is , 10^3. In binary system, 1 KiloByte represents 1024 bytes that is 2^{10}. The following table represents the various memory sizes:

Table 2.1 Memory Size (Read 2^10 as 2 power 10)

Name	Abbr.	Size
Kilo	K	2^10 = 1,024
Mega	M	2^20 = 1,048,576
Giga	G	2^30 = 1,073,741,824
Tera	T	2^40 = 1,099,511,627,776
Peta	P	2^50 = 1,125,899,906,842,624
Exa	E	2^60 = 1,152,921,504,606,846,976
Zetta	Z	2^70 = 1,180,591,620,717,411,303,424
Yotta	Y	2^80 = 1,208,925,819,614,629,174,706,173

Bytes are used to represent characters in a text. Different types of coding schemes are used to represent the character set and numbers. The most commonly used coding scheme is the **American Standard Code for Information Interchange** (ASCII). Each

binary value between 0 and 127 is used to represent a specific character. The ASCII value for (blank space) is 32 and the ASCII value of numeric 0 is 48. The range of ASCII values for lower case alphabets is from 97 to 122 and the range of ASCII values for the upper case alphabets is 65 to 90.

> **DO YOU KNOW?** The speed of a computer depends on the number of bits it can process at once. For example, a 64- bit computer can process 64-bit numbers in one operation, while a 32-bit computer break 64-bit numbers down into smaller pieces, making it slower.
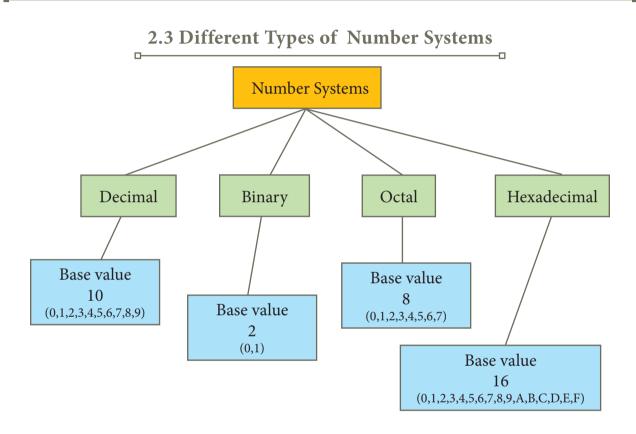
2.3 Different Types of Number Systems

Figure 2.3. Number Systems

A numbering system is a way of representing numbers. The most commonly used numbering system in real life is Decimal number system. Other number systems are Binary, Octal, Hexadecimal number system. Each number system is uniquely identified by its **base value** or **radix**. Radix or base is the count of number of digits in each number system. Radix or base is the general idea behind positional numbering system.

2.3.1 Decimal Number System

It consists of 0,1,2,3,4,5,6,7,8,9(10 digits). It is the oldest and most popular number system used in our day-to-day life. In the positional number system, each decimal digit is weighted relative to its position in the number. This means that each digit in the number is multiplied by 10 raised to a power corresponding to that digit's position.

Example

$$
\begin{aligned}
(123)_{10} &= 1\text{x}10^2 + 2\text{x}10^1 + 3\text{x}10^0 \\
&= 100 + 20 + 3 \\
&= (123)_{10}
\end{aligned}
$$

2.3.2 Binary Number System

There are only two digits in the Binary system, namely, 0 and 1. The numbers in the binary system are represented to the base 2 and the positional multipliers are the powers of 2. The left most bit in the binary number is called as the **M**ost **S**ignificant **B**it (MSB) and it has the largest positional weight. The right most bit is the **L**east **S**ignificant **B**it (LSB) and has the smallest positional weight.

1	1	0	1

MSB   LSB

Example

The binary sequence $(1101)_2$ has the decimal equivalent:

$$
\begin{aligned}
(1101)_2 &= 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 \\
&= 8 + 4 + 0 + 1 \\
&= (13)_{10}
\end{aligned}
$$

2.3.3 Octal Number System

Octal number system uses digits 0,1,2,3,4,5,6 and 7 (8 digits). Each octal digit has its own positional value or weight as a power of 8.

Example

The Octal sequence $(547)_8$ has the decimal equivalent:

$$
\begin{aligned}
(547)_8 &= 5 \times 8^2 + 4 \times 8^1 + 7 \times 8^0 \\
&= 5 \times 64 + 4 \times 8 + 7 \times 1 \\
&= 320 + 32 + 7 \\
&= (359)_{10}
\end{aligned}
$$

2.3.4 Hexadecimal Number System

A hexadecimal number is represented using base 16. Hexadecimal or Hex numbers are used as a shorthand form of binary sequence. This system is used to represent data in a more compact manner. Since 16 symbols are used, 0 to F, the notation is called hexadecimal. The first 10 symbols are the same as in the decimal system, 0 to 9 and the remaining 6 symbols are taken from the first 6 letters of the alphabet sequence, A to F, where A represents 10, B is 11, C is 12, D is 13, E is 14 and F is 15.
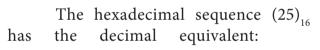
Table 2.2 Binary, Octal, Hexadecimal equivalent of Decimal Numbers

Decimal	Binary	Octal	Hexadecimal
0	0000	000	0000
1	0001	001	0001
2	0010	002	0002
3	0011	003	0003
4	0100	004	0004
5	0101	005	0005
6	0110	006	0006
7	0111	007	0007
8	1000	010	0008
9	1001	011	0009
10	1010	012	A
11	1011	013	B
12	1100	014	C
13	1101	015	D
14	1110	016	E
15	1111	017	F

Example

The hexadecimal sequence $(25)_{16}$ has the decimal equivalent:

$$(25)_{16} = 2 \times 16^1 + 5 \times 16^0$$
$$= 32 + 5$$
$$= (37)_{10}$$

Workshop

1. Identify the number system for the following numbers

S. No.	Number	Number system
1	$(1010)_{10}$	Decimal Number system
2	$(1010)_{2}$	
3	$(989)_{16}$	
4	$(750)_{8}$	
5	$(926)_{10}$	

2. State whether the following numbers are valid or not. If invalid, given reason.

S.No.	Statement	Yes / No	Reason (If invalid)
1.	786 is an Octal number		
2.	101 is a Binary number		
3.	Radix of Octal number is 7		

22

2.4 Number System Conversions

2.4.1 Decimal to Binary Conversion

To convert Decimal to Binary "**Repeated Division by 2**" method can be used. Any Decimal number divided by 2 will leave a remainder of 0 or 1. Repeated division by 2 will leave a sequence of 0s and 1s that become the binary equivalent of the decimal number. Suppose it is required to convert the decimal number N into binary form, dividing N by 2 in the decimal system, we will obtain a quotient N1 and a remainder R1, where R1 can have a value of either 0 or 1. The process is repeated until the quotient becomes 0 or 1. When the quotient is '0' or '1', it is the final remainder value. Write the final answer starting from final remainder value obtained to the first remainder value obtained.

Example

Convert $(65)_{10}$ into its equivalent binary number

2	65	
2	32 - ①	LSB
2	16 - 0	
2	8 - 0	
2	4 - 0	
2	2 - 0	
	① - 0	

MSB

Note :
$65/2 = 32 + 1$
$32/2 = 16 + 0$
$16/2 = 8 + 0$
$8/2 = 4 + 0$
$4/2 = 2 + 0$
$2/2 = 1 + 0$

$$(65)_{10} = (1\ 0\ 0\ 0\ 0\ 0\ 1)_2$$

2.4.2 Decimal to Octal Conversion

To convert Decimal to Octal, "**Repeated Division by 8**" method can be used. The method is the same we have learnt in 2.4.1, but in this method, we have to divide the given number by 8.

Example

Convert $(65)_{10}$ into its equivalent Octal number

8	65	
8	8 - 1	LSB
	1 - 0	

MSB

$$(65)_{10} = (1\ 0\ 1)_8$$

2.4.3 Decimal to Hexadecimal Conversion

To convert Decimal to Hexadecimal, "**Repeated division by 16**" method can be used. The method is the same as we have learnt in 2.4.1, but in this method, we have to divide the given number by 16.

Example

Convert $(31)_{10}$ into its equivalent hexadecimal number.

16	31	
	1 - 15	LSB

MSB

$$(16)_{10} = (1F)_{16} \text{(Refer Table 2.2 F=15)}$$

2.4.4 Conversion of fractional Decimal to Binary

The method of **repeated multiplication by 2** has to be used to convert such kind of decimal fractions.

The steps involved in the method of **repeated multiplication by 2**:

Step 1:   Multiply the decimal fraction by 2 and note the integer part. The integer part is either 0 or 1.

Step 2:   Discard the integer part of the previous product. Multiply the fractional part of the previous product by 2. Repeat Step 1 until the same fraction repeats or terminates (0).

Step 3:   The resulting integer part forms a sequence of 0s and 1s that become the binary equivalent of decimal fraction.

Step 4:   The final answer is to be written from first integer part obtained till the last integer part obtained.

Integer part

$0.2 \times 2 = 0.4$ 0   (first integer part obtained)

$0.4 \times 2 = 0.8$ 0

$0.8 \times 2 = 1.6$ 1

$0.6 \times 2 = 1.2$ 1

$0.2 \times 2 = 0.4$ 0   (last integer part obtained)

Note: Fraction repeats, the product is the same as in the first step.

Write the integer parts from top to bottom to obtain the equivalent fractional binary number. Hence $(0.2)_{10}=(0.00110011\ldots)_2 = (0.\overline{00110011})_2$

Workshop

3. Convert the following Decimal numbers to its equivalent Binary, Octal, Hexadecimal.

1) 1920

2) 255

3) 126

2.4.5 Binary to Decimal Conversion

To convert Binary to Decimal we can use positional notation method.

Step 1:   Write down the Binary digits and list the powers of 2 from right to left(Positional Notation)

Step 2: For each positional notation written for the digit, now write the equivalent weight.

Step 3: Multiply each digit with its corresponding weight

Step 4:   Add all the values.

Step 5:   Add the final values.

Table 2.3 Positional Notation and Weight

Positional Notation	Weight	Positional Notation	Weight
2^0	1	2^6	64
2^1	2	2^7	128
2^2	4	2^8	256
2^3	8	2^9	512
2^4	16	2^{10}	1024
2^5	32		

24

Example

Convert $(111011)_2$ into its equivalent decimal number.

Weight	32	16	8	4	2	1
Positional Notation	2^5	2^4	2^3	2^2	2^1	2^0
Given number	1	1	1	0	1	1

$$32+16+8+0+2+1 = (59)_{10}$$
$$(111011)_2 = (59)_{10}$$

2.4.6 Binary to Octal Conversion

Step 1: Group the given binary number into 3 bits from right to left.

Step 2: You can add preceding 0 to make a group of 3 bits if the left most group has less than 3 bits.

Step 3: Refer **Table 2.4** to find the Octal equivalent for each group.

Table 2.4 Octal numbers and their Binary equivalent

Octal	Binary Equivalent
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Example

Convert $(11010110)_2$ into octal equivalent number

Step 1: Group the given number into 3 bits from right to left.

011 010 110

Note: The left most groups have less than 3 bits, so 0 is added to its left to make a group of 3 bits.

Step-2: Refer **Table 2.4** to find Octal equivalent of each group

011   010   110

3   2   6

$(11010110)_2 = (326)_8$

2.4.7. Binary to Hexadecimal Conversion

Step 1: Group the given number into 4 bits from right to left.

Step 2: You can add preceding 0's to make a group of 4 bits if the left most group has less than 4 bits.

Step 3: Refer **Table 2.2** to find the Hexadecimal equivalent of each group.

Example

Convert $(1111010110)_2$ into Hexadecimal number

Step 1: Group the given number into 4 bits from right to left.

25

0011	1101	0110

Note: 0's are added to the left most group to make it a group of 4 bits

0011   1101   0110

3   D   6

$(1111010110)_2 = (3D6)_{16}$

2.4.8 Conversion of fractional Binary to Decimal equivalent

Follow the steps to convert fractional Binary number to its Decimal equivalent.

Step 1: Convert integral part of Binary to Decimal equivalent using positional notation method (Procedure is same as discussed in 2.4.5)

Step 2: To convert the fractional part of binary to its decimal equivalent.

Step 2.1: Write down the Binary digits in the fractional part

Step 2.2: For all the digits write powers of 2 from left to right starting from 2^{-1}, 2^{-2}, 2^{-3}......2^{-n},

now write the equivalent weight.

Step 2.3: Multiply each digit with its corresponding weight

Step 2.4: Add all the values which you obtained in Step 2.3

Table 2.5 Positional notation and weight

Weight	Positional notation
0.5	2^{-1} (1/2)
0.25	2^{-2} (1/4)
0.125	2^{-3} (1/8)
0.0625	2^{-4} (1/16)
0.03125	2^{-5} (1/32)
0.015625	2^{-6} (1/64)
0.0078125	2^{-7} (1/128)

Step 3: To get final answer write the integral part (after conversion), followed by a decimal point(.) and the answer arrived at Step 2.4

Example
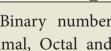
Convert the given Binary number $(11.011)_2$ into its decimal equivalent Integer part $(11)_2$ = 3 (Refer **table 2.2**)

2^1	2^0		2^{-1}	2^{-2}	2^{-3}
↑	↑		↑	↑	↑
1	1	.	0	1	1

3 + . (0×0.5 + 1×0.25 + 1×0.125)
= 3. 325
$(11.011)_2$ = $(3.325)_{10}$

Workshop

4. Convert the given Binary number into its equivalent Decimal, Octal and Hexadecimal number.

1) 101110101
2) 1011010
3) 101011111

26

2.4.9. Octal to Decimal Conversion

To convert Octal to Decimal, we can use positional notation method.

1. Write down the Octal digits and list the powers of 8 from right to left(Positional Notation)

2. For each positional notation of the digit write the equivalent weight.

3. Multiply each digit with its corresponding weight

4. Add all the values

Example

Convert $(1265)_8$ to equivalent Decimal number

Weight	512	64	8	1
Positional Notation	8^3	8^2	8^1	8^0
Given number	1	2	6	5

$(1265)_8 = 512 \times 1 + 64 \times 2 + 8 \times 6 + 1 \times 5$
$\qquad\quad = 512 + 128 + 48 + 5$
$(1265)_8 = (693)_{10}$
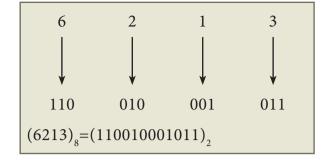
2.4.10 Octal to Binary Conversion

For each Octal digit in the given number refer **Table 2.4** and write its Binary equivalent (3 digits)

Example

Convert $(6213)_8$ to equivalent Binary number

6	2	1	3
↓	↓	↓	↓
110	010	001	011

$(6213)_8 = (110010001011)_2$

Workshop

5. Convert the following Octal numbers into Binary numbers.
(A) 472   (B) 145   (C) 347
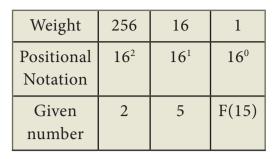(D) 6247   (E) 645

2.4.11 Hexadecimal to Decimal Conversion

To convert Hexadecimal to Decimal we can use positional notation method.

1. Write down the Hexadecimal digits and list the powers of 16 from right to left(Positional Notation)

2. For each positional notation written for the digit, now write the equivalent weight.

3. Multiply each digit with its corresponding weight

4. Add all the values to get one final value.

Example

Convert $(25F)_{16}$ into its equivalent Decimal number.

Weight	256	16	1
Positional Notation	16^2	16^1	16^0
Given number	2	5	F(15)

$$(25F)_{16} = 2 \times 256 + 5 \times 16 + 15 \times 1$$
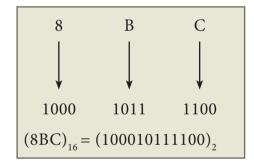$$= 512 + 80 + 15$$
$$(25F)_{16} = (607)_{10}$$

2.4.12 Hexadecimal to Binary Conversion

Refer **Table 2.2** and write the Binary equivalent (4 bits) for each Hexadecimal digit for the given number

Example

Convert $(8BC)_{16}$ into equivalent Binary number

8	B	C
↓	↓	↓
1000	1011	1100

$(8BC)_{16} = (100010111100)_2$

Workshop 👥

6. Convert the following Hexadecimal numbers to Binary numbers
(A) A6   (B) BE
(C) 9BC8   (D) BC9

2.5 Binary Representation for Signed Numbers

Computers can handle both positive (unsigned) and negative (signed) numbers. The simplest method to represent negative binary numbers is called **Signed Magnitude**. In signed magnitude method, the left most bit is Most Significant Bit (MSB), is called **sign bit or parity bit**.

The numbers are represented in computers in different ways:

- Signed Magnitude representation
- 1's Complement
- 2's Complement

2.5.1 Signed Magnitude representation

The value of the whole numbers can be determined by the sign used before it. If the number has '+' sign or no sign it will be considered as positive. If the number has '-' sign it will be considered as negative.
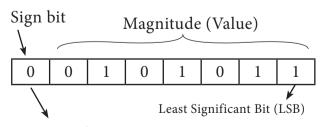
Example:

+43 or 43 is a positive number
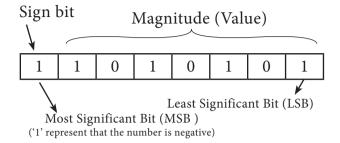
-43 is a negative number

In signed binary representation, the left most bit is considered as sign bit. If this bit is 0, it is a positive number and if it 1, it is a negative number. Therefore a signed binary number has 8 bits, only 7 bits used for storing values (magnitude) and the 1 bit is used for sign.

+43 is represented in memory as follows:

Sign bit   Magnitude (Value)

0	0	1	0	1	0	1	1

Least Significant Bit (LSB)

Most Significant Bit (MSB)
('0' represent that the number is positive)

-43 can be represented in memory as follows.

Sign bit   Magnitude (Value)

| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |

Least Significant Bit (LSB)
Most Significant Bit (MSB)
('1' represent that the number is negative)

2.5.2 1's Complement representation

This is an easier approach to represent signed numbers. This is for negative numbers only i.e. the number whose MSB is 1.

The steps to be followed to find 1's complement of a number:

Step 1:   Convert given Decimal number into Binary

Step 2:   Check if the binary number contains 8 bits , if less add 0 at the left most bit, to make it as 8 bits.

Step 3:   Invert all bits (i.e. Change 1 as 0 and 0 as 1)

Example

Find 1's complement for $(-24)_{10}$

Given Number	Binary Number	1's Compliment
$(-24)_{10}$	00011000	11100111

2.5.3 2's Complement representation

The 2's-complement method for negative number is as follows:

a.   Invert all the bits in the binary sequence (i.e., change every 0 to1 and every 1 to 0 ie.,1's complement)

b.   Add 1 to the result to the Least Significant Bit (LSB).

Example

2's Complement represent of $(-24)_{10}$

Binary equivalent of +24:	11000
8bit format:	00011000
1's complement:	11100111
Add 1 to LSB:	+1
2's complement of -24:	**11101000**

Workshop

7. Write the 1's complement number and 2's complement number for the following decimal numbers:
(A) 22   (B) -13   (C) 65 (D) -46   (E) 255

2.6 Binary Arithmetic

As decimal numbers, the binary numbers also permit computations like addition, subtraction, multiplication and division. The following session deals only with binary addition and subtraction.

2.6.1 Binary Addition

The following table is useful when adding two binary numbers.

A	B	SUM (A + B)	Carry
0	0	0	-
0	1	1	-
1	0	1	-
1	1	0	1

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In $1 + 1 = 10$, is considered as sum 0 and the 1 as carry bit. This carry bit is added with the previous position of the bit pattern.

Example Add: $1011_2 + 1001_2$

(Carry Bit)→   1   1

```
          1    0    1    1  ⎫
                             ⎬ 1 0
      +   1    0    0    1  ⎭
      ─────────────────────
      1   0    1    0    0
```

$1011_2 + 1001_2 = 10100_2$

Example Perform Binary addition for the following: $23_{10} + 12_{10}$

Step 1: Convert 23 and 12 into binary form

23_{10}				
2's power	16	8	4	2	1
Binary Number	1	0	1	1	1

$23_{10} = 00010111_2$

12_{10}			
2's power	8	4	2	1
Binary Number	1	1	0	0

$12_{10} = 00001100_2$

Step 2: Binary addition of 23 and 12:

Carry Bit →	1	1					
$23_{10} = 0$	0	0	1	0	1	1	1
$12_{10} = 0$	0	0	0	1	1	0	0
$35_{10} = 0$	**0**	**1**	**0**	**0**	**0**	**1**	**1**
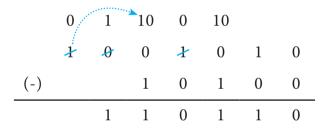
2.6.2 Binary Subtraction

The table for Binary Subtraction is as follows:

A	B	Difference (A-B)	Borrow
0	0	0	0
1	0	1	0
1	1	0	0
0	1	1	1

When subtracting 1 from 0, borrow 1 from the next Most Significant Bit, when borrowing from the next Most Significant Bit, if it is 1, replace it with 0. If the next Most Significant Bit is 0, you must borrow from a more significant bit that contains 1 and replace it with 0 and 0s upto that point become 1s.

Example Subtract $1001010_2 - 10100_2$

```
          0    1   10    0   10
          1    0    0    1    0    1    0
  (-)               1    0    1    0    0
      ─────────────────────────────────
          1    1    0    1    1    0
```

Example Perform binary addition for the following: $(-21)_{10} + (5)_{10}$

Step 1: Change -21 and 5 into binary form

21_{10}				
2's power	16	8	4	2	1
Binary Number	1	0	1	0	1

$21_{10} = 00010101_2$

5_{10}		
2's power	4	2	1
Binary Number	1	0	1

$5_{10} = 00000101_2$

Step 2:

21_{10}	0	0	0	1	0	1	0	1
1's Compliment	1	1	1	0	1	0	1	0
2's Compliment	1	1	1	0	1	0	1	1

Step 3:

Binary Addition of -21 and 5 :

Carry bit				1	1	1	1	
-21_{10}	1	1	1	0	1	0	1	1
5_{10}	0	0	0	0	0	1	0	1
-16_{10} (Result)	1	1	1	1	0	0	0	0

Workshop

8. Perform the following binary computations:
(A) $10_{10} + 15_{10}$ (B) $-12_{10} + 5_{10}$
(C) $14_{10} - 12_{10}$ (D) $(-2_{10}) - (-6_{10})$

2.7 Representing Characters in Memory

As represented in introduction, all the input data given to the computer should be in understandable format. In general, 26 uppercase letters, 26 lowercase letters, 0 to 9 digits and special characters are used in a computer, which is called character set. All these character set are denoted through numbers only. All Characters in the character set needs a common encoding system. There are several encoding systems used for computer. They are

- BCD – Binary Coded Decimal
- EBCDIC – Extended Binary Coded Decimal Interchange Code

- ASCII – American Standard Code for Information Interchange

- Unicode

- ISCII - Indian Standard Code for Information Interchange

2.7.1 Binary Coded Decimal (BCD)

This encoding system is not in the practice right now. This is 2^6 bit encoding system. This can handle $2^6 = 64$ characters only.

2.7.2 American Standard Code for Information Interchange (ASCII)

This is the most popular encoding system recognized by United States. Most of the computers use this system. Remember this encoding system can handle English characters only. This can handle 2^7 bit which means 128 characters.

In this system, each character has individual number (Refer **Appendix**).

The new edition (version) ASCII -8, has 2^8 bits and can handle 256 characters are represented from 0 to 255 unique numbers.

The ASCII code equivalent to the uppercase letter 'A' is 65. The binary representation of ASCII (7 bit) value is 1000001. Also 01000001 in ASCII-8 bit.

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2.7.3 Extended Binary Coded Decimal Interchange Code (EBCDIC)

This is similar to ASCII Code with 8 bit representation. This coding system is formulated by International Business Machine(IBM). The coding system can handle 256 characters. The input code in ASCII can be converted to EBCDIC system and vice - versa.

2.7.4 Indian Standard Code for Information Interchange (ISCII)

ISCII is the system of handling the character of Indian local languages. This as a 8-bit coding system. Therefore it can handle 256 (2^8) characters. This system is formulated by the department of Electronics in India in the year 1986-88 and recognized by Bureau of Indian Standards (BIS). Now this coding system is integrated with Unicode.

2.7.5 Unicode

This coding system is used in most of the modern computers. The popular coding scheme after ASCII is Unicode. ASCII can represent only 256 characters. Therefore English and European Languages alone can be handled by ASCII. Particularly there was a situation, when the languages like Tamil, Malayalam, Kannada and Telugu could not be represented by ASCII. Hence, the Unicode was generated to handle all the coding system of Universal languages. This is 16 bit code and can handle 65536 characters.

Unicode scheme is denoted by hexadecimal numbers. The Unicode table of Tamil, Malayalam, Telugu and Kannada is shown Table 2.6

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Table 2.6

Unicode Table of Tamil

	0B8	0B9	0BA	0BB	0BC	0BD	0BE	0BF
0		0B90		0BB0	0BC0	0BD0		0BF0
1				0BB1	0BC1			0BF1
2	0B82	0B92		0BB2	0BC2			0BF2
3	0B83	0B93	0BA3	0BB3				0BF3
4		0B94	0BA4	0BB4				0BF4
5	0B85	0B95		0BB5				0BF5
6	0B86			0BB6	0BC6		0BE6	0BF6
7	0B87			0BB7	0BC7	0BD7	0BE7	0BF7
8	0B88		0BA8	0BB8	0BC8		0BE8	0BF8
9	0B89	0B99	0BA9	0BB9			0BE9	0BF9
A	0B8A	0B9A	0BAA		0BCA		0BEA	0BFA
B					0BCB		0BEB	
C		0B9C			0BCC		0BEC	
D					0BCD		0BED	
E	0B8E	0B9E	0BAE	0BBE			0BEE	
F	0B8F	0B9F	0BAF	0BBF			0BEF	

Unicode Table of Malayalam

	0D0	0D1	0D2	0D3	0D4	0D5	0D6	0D7
0	0D00	0D10	0D20	0D30	0D40		0D60	0D70
1	0D01		0D21	0D31	0D41		0D61	0D71
2	0D02	0D12	0D22	0D32	0D42		0D62	0D72
3	0D03	0D13	0D23	0D33	0D43		0D63	0D73
4		0D14	0D24	0D34	0D44	0D54		0D74
5	0D05	0D15	0D25	0D35		0D55		0D75
6	0D06	0D16	0D26	0D36	0D46	0D56	0D66	0D76
7	0D07	0D17	0D27	0D37	0D47	0D57	0D67	0D77
8	0D08	0D18	0D28	0D38	0D48	0D58	0D68	0D78
9	0D09	0D19	0D29	0D39		0D59	0D69	0D79
A	0D0A	0D1A	0D2A	0D3A	0D4A	0D5A	0D6A	0D7A
B	0D0B	0D1B	0D2B	0D3B	0D4B	0D5B	0D6B	0D7B
C	0D0C	0D1C	0D2C	0D3C	0D4C	0D5C	0D6C	0D7C
D		0D1D	0D2D	0D3D	0D4D	0D5D	0D6D	0D7D
E	0D0E	0D1E	0D2E	0D3E	0D4E	0D5E	0D6E	0D7E
F	0D0F	0D1F	0D2F	0D3F	0D4F	0D5F	0D6F	0D7F

Table 2.6

| | Unicode Table of Telugu | | | | | | | | Unicode Table of Kannada | | | | | | | |

Unicode Table of Telugu

	0C0	0C1	0C2	0C3	0C4	0C5	0C6	0C7
0	ఀ 0C00	ఐ 0C10	ఠ 0C20	ర 0C30	ఀ 0C40		ౠ 0C60	
1	ఁ 0C01		డ 0C21	ఱ 0C31	ి 0C41		ౡ 0C61	
2	ం 0C02	ఒ 0C12	ఢ 0C22	ల 0C32	ీ 0C42		ౢ 0C62	
3	ః 0C03	ఓ 0C13	ణ 0C23	ళ 0C33	ు 0C43		ౣ 0C63	
4		ఔ 0C14	త 0C24	ఴ 0C34	ూ 0C44			
5	అ 0C05	క 0C15	థ 0C25	వ 0C35		ఀ 0C55		
6	ఆ 0C06	ఖ 0C16	ద 0C26	శ 0C36	ె 0C46	ఀ 0C56	౦ 0C66	
7	ఇ 0C07	గ 0C17	ధ 0C27	ష 0C37	ే 0C47		౧ 0C67	
8	ఈ 0C08	ఘ 0C18	న 0C28	స 0C38	ై 0C48	చ 0C58	౨ 0C68	౸ 0C78
9	ఉ 0C09	ఙ 0C19		హ 0C39		జ 0C59	౩ 0C69	౹ 0C79
A	ఊ 0C0A	చ 0C1A	ప 0C2A		ొ 0C4A	ఞ 0C5A	౪ 0C6A	౺ 0C7A
B	ఋ 0C0B	ఛ 0C1B	ఫ 0C2B		ో 0C4B		౫ 0C6B	౻ 0C7B
C	ఌ 0C0C	జ 0C1C	బ 0C2C		ౌ 0C4C		౬ 0C6C	౼ 0C7C
D		ఝ 0C1D	భ 0C2D	ఽ 0C3D	్ 0C4D		౭ 0C6D	౽ 0C7D
E	ఎ 0C0E	ఞ 0C1E	మ 0C2E	ా 0C3E			౮ 0C6E	౾ 0C7E
F	ఏ 0C0F	ట 0C1F	య 0C2F	ి 0C3F			౯ 0C6F	౿ 0C7F

Unicode Table of Kannada

	0C8	0C9	0CA	0CB	0CC	0CD	0CE	0CF
0	ಀ 0C80	ಐ 0C90	ಠ 0CA0	ರ 0CB0	ೀ 0CC0		ೠ 0CE0	
1	ಁ 0C81		ಡ 0CA1	ಱ 0CB1	ಿ 0CC1		ೡ 0CE1	ⷑ 0CF1
2	ಂ 0C82	ಒ 0C92	ಢ 0CA2	ಲ 0CB2	ೂ 0CC2		ೢ 0CE2	ೲ 0CF2
3	ಃ 0C83	ಓ 0C93	ಣ 0CA3	ಳ 0CB3	ೃ 0CC3		ೣ 0CE3	
4		ಔ 0C94	ತ 0CA4		ೄ 0CC4			
5	ಅ 0C85	ಕ 0C95	ಥ 0CA5	ವ 0CB5		ೕ 0CD5		
6	ಆ 0C86	ಖ 0C96	ದ 0CA6	ಶ 0CB6	ೆ 0CC6	ೖ 0CD6	೦ 0CE6	
7	ಇ 0C87	ಗ 0C97	ಧ 0CA7	ಷ 0CB7	ೇ 0CC7		೧ 0CE7	
8	ಈ 0C88	ಘ 0C98	ನ 0CA8	ಸ 0CB8	ೈ 0CC8		೨ 0CE8	
9	ಉ 0C89	ಙ 0C99		ಹ 0CB9			೩ 0CE9	
A	ಊ 0C8A	ಚ 0C9A	ಪ 0CAA		ೊ 0CCA		೪ 0CEA	
B	ಋ 0C8B	ಛ 0C9B	ಫ 0CAB		ೋ 0CCB		೫ 0CEB	
C	ಌ 0C8C	ಜ 0C9C	ಬ 0CAC	಼ 0CBC	ೌ 0CCC		೬ 0CEC	
D		ಝ 0C9D	ಭ 0CAD	ಽ 0CBD	್ 0CCD		೭ 0CED	
E	ಎ 0C8E	ಞ 0C9E	ಮ 0CAE	ಾ 0CBE		ೞ 0CDE	೮ 0CEE	
F	ಏ 0C8F	ಟ 0C9F	ಯ 0CAF	ಿ 0CBF			೯ 0CEF	

Appendix
American Standard Code for Information Interchange (ASCII)
(Few specific characters only)

Alphabets

Alphabets	Decimal number	Binary number (8 bit)	Octal number	Hexadecimal number
A	65	01000001	101	41
B	66	01000010	102	42
C	67	01000011	103	43
D	68	01000100	104	44
E	69	01000101	105	45
F	70	01000110	106	46
G	71	01000111	107	47
H	72	01001000	110	48
I	73	01001001	111	49
J	74	01001010	112	4A
K	75	01001011	113	4B
L	76	01001100	114	4C
M	77	01001101	115	4D
N	78	01001110	116	4E
O	79	01001111	117	4F
P	80	01010000	120	50
Q	81	01010001	121	51
R	82	01010010	122	52
S	83	01010011	123	53
T	84	01010100	124	54
U	85	01010101	125	55
V	86	01010110	126	56
W	87	01010111	127	57
X	88	01011000	130	58
Y	89	01011001	131	59
Z	90	01011010	132	5A
a	97	01100001	141	61
b	98	01100010	142	62
c	99	01100011	143	63
d	100	01100100	144	64
e	101	01100101	145	65

f	102	01100110	146	66
g	103	01100111	147	67
h	104	01101000	150	68
i	105	01101001	151	69
j	106	01101010	152	6A
k	107	01101011	153	6B
l	108	01101100	154	6C
m	109	01101101	155	6D
n	110	01101110	156	6E
o	111	01101111	157	6F
p	112	01110000	160	70
q	113	01110001	161	71
r	114	01110010	162	72
s	115	01110011	163	73
t	116	01110100	164	74
u	117	01110101	165	75
v	118	01110110	166	76
w	119	01110111	167	77
x	120	01111000	170	78
y	121	01111001	171	79
z	122	01111010	172	7A

Numerals

Alphabets	Decimal number	Binary number (8 bit)	Octal number	Hexadecimal number
0	48	00110000	60	30
1	49	00110001	61	31
2	50	00110010	62	32
3	51	00110011	63	33
4	52	00110100	64	34
5	53	00110101	65	35
6	54	00110110	66	36
7	55	00110111	67	37
8	56	00111000	70	38
9	57	00111001	71	39

Special Characters

Special symbols	Decimal number	Binary number (8 bit)	Octal number	Hexadecimal number
Blank	32	00100000	40	20
!	33	00100001	41	21
"	34	00100010	42	22
#	35	00100011	43	23
$	36	00100100	44	24
%	37	00100101	45	25
&	38	00100110	46	26
'	39	00100111	47	27
(	40	00101000	50	28
)	41	00101001	51	29
*	42	00101010	52	2A
+	43	00101011	53	2B
,	44	00101100	54	2C
-	45	00101101	55	2D
.	46	00101110	56	2E
/	47	00101111	57	2F
:	58	00111010	72	3A
;	59	00111011	73	3B
<	60	00111100	74	3C
=	61	00111101	75	3D
>	62	00111110	76	3E
?	63	00111111	77	3F
@	64	01000000	100	40
[	91	01011011	133	5B
\	92	01011100	134	5C
]	93	01011101	135	5D
^	94	01011110	136	5E
_	95	01011111	137	5F
`	96	01100000	140	60
{	123	01111011	173	7B
|	124	01111100	174	7C
}	125	01111101	175	7D
~	126	01111110	176	7E

Evaluation

I Choose the best answer

1.   Which refers to the number of bits processed by a computer's CPU?

A) Byte   B) Nibble   C) Word length   D) Bit

2.   How many bytes does 1 KiloByte contain?

A) 1000   B) 8   C) 4   D) 1024

3.   Expansion for ASCII

A) American School Code for Information Interchange

B) American Standard Code for Information Interchange

C) All Standard Code for Information Interchange

D) American Society Code for Information Interchange

4. 2^{50} is referred as

A) Kilo   B) Tera   C) Peta   D) Zetta

5.   How many characters can be handled in Binary Coded Decimal System?

A) 64   B) 255   C) 256   D) 128

6.   For 1101_2 what is the Hexadecimal equivalent?

A) F   B) E

C) D   D) B

7.   What is the 1's complement of 00100110?

A) 00100110   B) 11011001

C) 11010001   D) 00101001

8.   Which amongst this is not an Octal number?

A) 645   B) 234

C) 876   D) 123

II   Very Short Answers

1.   What is data?

2.   Write the 1's complement procedure.

3.   Convert $(46)_{10}$ into Binary number

4.   We cannot find 1's complement for $(28)_{10}$. State reason.

5.   List the encoding systems for characters in memory.

III   Short Answers

1.   What is radix of a number system? Give example

2.   Write note on binary number system.

3.   Convert $(150)_{10}$ into Binary, then convert that Binary number to Octal

4.   Write short note on ISCII

5.   Add   a) $-22_{10}+15_{10}$ b) $20_{10}+25_{10}$

IV   Detail Answers

1.   a) Write the procedure to convert fractional Decimal to Binary

b) Convert $(98.46)_{10}$ to Binary

2.   Find 1's Complement and 2's Complement for the following Decimal number

a) -98   b) -135

3.   a) Add $1101010_2+101101_2$

b) Subtract $1101011_2 - 111010_2$

Computer Organization

Learning Objectives

- To know the organization of the computer components and their interconnections.

- To know the processors and their characteristics.

- To know the importance of memory devices and their roles in a computer.

- To explore RAM, ROM and differentiate each of them.

- To know about cache memory and how it improves the performance of a computer

- To know the secondary devices and their usage

- To know about the ports and interfaces so that external devices can be connected
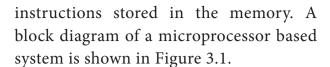
3.1 Introduction

Computer organization deals with the hardware components of a computer system. It includes Input / Output devices, the Central Processing Unit, storage devices and primary memory. It is concerned with how the various components of computer hardware operate. It also deals with how they are interconnected to implement an architectural specification. The term computer organization looks similar to the term computer architecture. But, computer architecture deals with the engineering considerations involved in designing a computer. On the other hand, Computer Organization deals with the hardware components that are transparent to the programmer.

3.2. Basics of Microprocessors

The CPU is the major component of a computer, which performs all tasks. This is realized by the microprocessor which is an Integrated Circuit. Microprocessors were first introduced in early 1970s. The first general purpose microprocessor, 4004 was developed by Intel Inc.

The microprocessor is a programmable multipurpose silicon chip. It is driven by clock pulses. It accepts input as a binary data and after processing, it provides the output data as per the

instructions stored in the memory. A block diagram of a microprocessor based system is shown in Figure 3.1.
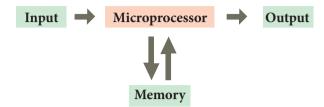
Figure 3.1 A Microprocessor - Based System

The microprocessor is made up of 3 main units. They are:

- **Arithmetic and Logic unit (ALU):** To perform arithmetic and logical instructions based on computer instructions.

- **Control unit:** To control the overall operations of the computer through signals.

- **Registers (Internal Memory):** They are used to hold the instruction and data for the execution of the processor.

The microprocessor is able to communicate with the memory units and the Input / Output devices as in Figure 3.2. The system bus is a bunch of wires which is the collection of address bus, data bus and control bus that serves as communication channels between the Microprocessor and other devices.
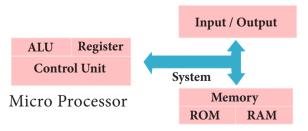
Figure 3.2 Interconnecting the Microprocessor with Other Devices
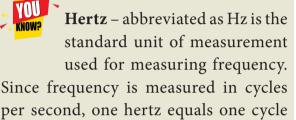
Characteristics of Microprocessors

A Microprocessor's performance depends on the following characteristics:

a) Clock speed

b) Instruction set

c) Word size

Speed Measurement

Hertz – abbreviated as Hz is the standard unit of measurement used for measuring frequency. Since frequency is measured in cycles per second, one hertz equals one cycle per second.

Hertz is commonly used to measure wave frequencies, such as sound waves, light waves, and radio waves. For example, the average human ear can detect sound waves between 20 and 20,000 Hz. Sound waves close to 20 Hz have a low pitch and are called "bass" frequencies. Sound waves above 5,000 Hz have a high pitch and are called "treble" frequencies.

While hertz can be used to measure wave frequencies, it is also used to measure the speed of computer processors. For example, each CPU is rated at a specific clock speed. This number indicates how many instruction cycles the processor can perform in every second. Since modern processors can perform millions or even billions of instructions per second, clock speeds are typically measured in megahertz or gigahertz.

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a) Clock Speed

Every microprocessor has an **internal clock** that regulates the speed at which it executes instructions. The speed at which the microprocessor executes instructions is called the **clock speed**. Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

b) Instruction Set

A command which is given to a computer to perform an operation on data is called an **instruction**. Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**. This instruction set carries out the following types of operations:

- Data transfer

- Arithmetic operations

- Logical operations

- Control flow

- Input/output
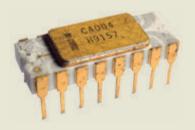
c) Word Size

- The number of bits that can be processed by a processor in a single instruction is called its word size. **Word size** determines the amount of RAM that can be accessed by a microprocessor at one time and the total number of pins on the microprocessor. Total number of input and output pins in turn determines the architecture of the microprocessor.

DO YOU KNOW? The first commercial microprocessor, Intel 4004 is a 4 bit processor. It has 4 input pins and 4 output pins. Number of output pins is always equal to the number of input pins. It can process 4 bits at a time. So it is called as a 4 bit processor.

Intel 4004

Produced	From late 1971 to 1981
Manufacturer	Intel Inc.
Clock Speed	740 kHZ
Size	10 Micrometer (µm)
Transistors	2300
Data width	4 bits
Package	16 pin

Intel Inc. released many microprocessors like Intel 8085 which is an 8 bit processor, Intel 8086 which is a 16 bit processor and so on. Currently most of the microprocessors use 32 bit or 64 bit architecture.

3.3 Data communication between CPU and memory

The Central Processing Unit(CPU) has a Memory Data Register (MDR) and a Memory Address Register (MAR). The Memory Data Register (MDR) keeps the data which is transferred between the Memory and the CPU. The Program

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Counter (PC) is a special register in the CPU which always keeps the address of the next instruction to be executed. The Arithmetic and Logic unit of CPU places the address of the memory to be fetched, into the Memory Address Register.

A bus is a collection of wires used for communication between the internal components of a computer. The address bus is used to point a memory location. A decoder, a digital circuit is used to point to the specific memory location where the **word** can be located. The address register is connected with the address bus, which provides the address of the instruction. A data bus is used to transfer data between the memory and the CPU. The data bus is bidirectional and the address bus is unidirectional. The control bus controls both read and write operations. The read operation fetches data from memory and transfers to MDR. A single control line performs two operations like Read/Write using 1or 0. Also, the write operation transfers data from the MDR to memory. This organization is shown in Figure 3.3.
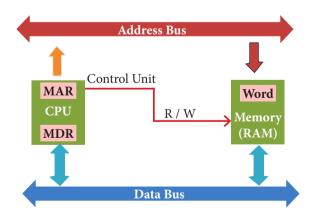
Figure 3.3 Bus connectivity between CPU and Memory

The word in the RAM has the same size (no. of bits) as the Memory Data

Register (MDR). If the processor is an 8-bit processor like Intel 8085, its MDR and the word in the RAM both have 8 bits.

If the size of the MDR is eight bits, which can be connected with a word in the memory which is also eight bits size. The data bus has eight parallel wires to transfer data either from MDR to word or word to MDR based on the control(Read or write). This control line is labeled as R/W , which becomes 1 means READ operation and 0 means WRITE operation. Figure 3.4 shows the content of MDR and the word before the READ operation.Also, Figure 3.5 shows the content of MDR and the word after the READ operation.
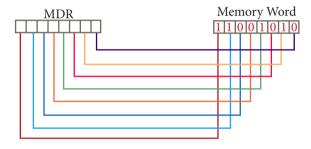
Figure 3.4 Before the read operation
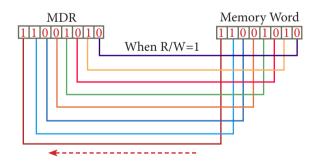
Figure 3.5 After the read operation

The read operation transfers the data(bits) from word to memory data register. The write operation transfers the data(bits) from memory data register to word.

If 5V is applied at one end of a wire, the other end also can receive 5V. In the same way, the buses are wires, and the binary data are voltages (5V as 1 and 0V as 0), and these buses can simply pass the data as voltages from one end to other.

3.4 Types of Microprocessors

Microprocessors can be classified based on the following criteria:

- The width of data that can be processed

- The instruction set

3.4.1 Classification of Microprocessors based on the Data Width

Depending on the data width, microprocessors can process instructions. The microprocessors can be classified as follows:

- 8-bit microprocessor

- 16-bit microprocessor

- 32-bit microprocessor

- 64-bit microprocessor

3.4.2 Classification of Microprocessors based on Instruction Set

The size of the instruction set is another important consideration while categorizing microprocessors. Initially, microprocessors had very small instruction sets because complex hardware was expensive as well as difficult to build. As technology had developed to overcome these issues, more and more complex instructions were added to increase the functionality of microprocessors. Let us learn more about the two types of microprocessors based on their instruction sets.

3.4.2.1 Reduced Instruction Set Computers (RISC)

RISC stands for **Reduced Instruction Set Computers**. They have a small set of highly optimized instructions. Complex instructions are also implemented using simple instructions, thus reducing the size of the instruction set.

Examples of RISC processors are Pentium IV, Intel P6, AMD K6 and K7.

3.4.2.2 Complex Instruction Set Computers (CISC)

CISC stands for **Complex Instruction Set Computers**. They support hundreds of instructions. Computers supporting CISC can accomplish a wide variety of tasks, making them ideal for personal computers.

Examples of CISC processors are Intel 386 & 486, Pentium, Pentium II and III, and Motorola 68000.

3.5 Memory Devices

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data

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and instructions are stored. There are two types of accessing methods to access (read or write) the memory. They are sequential access and random access. In sequential access, the memory is accessed in an orderly manner from starting to end. But, in random access, any byte of memory can be accessed directly without navigating through previous bytes. Different memory devices are arranged according to the capacity, speed and cost as shown in Figure 3.6.
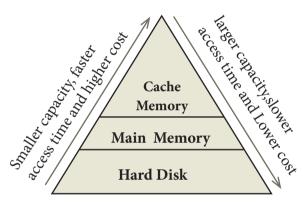
Figure 3.6 Memory Hierarchy

3.5.1 Random-Access Memory (RAM)

The main memory is otherwise called as **Random Access Memory**. This is available in computers in the form of Integrated Circuits (ICs). It is the place in a computer where the Operating System, Application Programs and the data in current use are kept temporarily so that they can be accessed by the computer's processor. The smallest unit of information that can be stored in the memory is called as a bit. The memory can be accessed by a collection of 8 bits which is called as a byte. The bytes are referred by 'B'. If a computer has 1 megabyte of memory, then it can store 10,48,576 bytes (or characters) of information. [Hence 1MB is 1024KB and 1 KB is 1024 Bytes, So 1024X1024 =10,48,576 Bytes]

RAM is a volatile memory, which means that the information stored in it is not permanent. As soon as the power is turned off, whatever data that resides in RAM is lost. It allows both read and write operations.

3.5.2 Types of RAM

There are two basic types of RAM

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

These two types differ in the technology they use to hold data. Dynamic RAM being a common type needs to be refreshed frequently. Static RAM needs to be refreshed less often, which makes it faster. Hence, Static RAM is more expensive than Dynamic RAM.

3.5.3 Read Only Memory (ROM)

Read only memory refers to special memory in a computer with pre-recorded data at manufacturing time which cannot be modified. The stored programs that start the computer and perform diagnostics are available in ROMs. ROM stores critical programs such as the program that boots the computer. Once the data has been written onto a ROM chip, it cannot be modified or removed and can only be read. ROM retains its contents even when the computer is turned off. So, ROM is called as a non-volatile memory.

3.5.3.1 Programmable Read Only Memory (PROM)

Programmable read only memory is also a non-volatile memory on which data can be written only once. Once a

program has been written onto a PROM, it remains there forever. Unlike the main memory, PROMs retain their contents even when the computer is turned off.

The PROM differs from ROM. PROM is manufactured as a blank memory, whereas a ROM is programmed during the manufacturing process itself. PROM programmer or a PROM burner is used to write data to a PROM chip. The process of programming a PROM is called burning the PROM.

3.5.3.2 Erasable Programmable ReadOnly Memory (EPROM)

Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM, but the content can be erased using ultraviolet rays. EPROM retains its contents until it is exposed to ultraviolet light. The ultraviolet light clears its contents, making it possible to reprogram the memory.

An EPROM differs from a PROM, PROM can be written only once and cannot be erased. EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

Figure 3.7 Erasable Programmable ReadOnly Memory

DO YOU KNOW? Most of the EPROM chips have a transparent area at the top surface which is covered by stickers. If it gets removed, the ultraviolet light in the sunlight may erase the contents.

3.5.3.3 Electrically Erasable Programmable Read Only Memory (EEPROM)

Electrically Erasable Programmable Read Only Memory is a special type of PROM that can be erased by exposing it to an electrical charge. Like other types of PROM, EEPROM retains its contents even when the power is turned off. Comparing with all other types of ROM, EEPROM is slower in performance.

3.5.4 Cache Memory

The cache memory is a very high speed and expensive memory, which is used to speed up the memory retrieval process. Due to its higher cost, the CPU comes with a smaller size of cache memory compared with the size of the main memory. Without cache memory, every time the CPU requests the data, it has to be fetched from the main memory which will consume more time. The idea of introducing a cache is that, this extremely fast memory would store data that is frequently accessed and if possible, the data that is closer to it. This helps to achieve the fast response time, Where response Time, (Access Time) refers to how quickly the memory can respond to a read / write request. Figure 3.8 shows the arrangement of cache memory between the CPU and the main memory.

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Figure 3.8 Cache Memory Arrangement

3.6 Secondary Storage Devices

A computer generally has limited amount of main memory which is expensive and volatile. To store data and programs permanently, secondary storage devices are used. Secondary storage devices serve as a supportive storage to main memory and they are non-volatile is nature, secondary storage is also called as Backup storage

3.6.1 Hard Disks

Hard disk is a magnetic disk on which you can store data. The hard disk has the stacked arrangement of disks accessed by a pair of heads for each of the disks. The hard disks come with a single or double sided disk.

3.6.2 Compact Disc (CD)

A CD or CD-ROM is made from 1.2 millimeters thick, polycarbonate plastic material. A thin layer of aluminum or gold is applied to the surface. CD data is represented as tiny indentations known as "pits", encoded in a spiral track moulded into the top of the polycarbonate layer. The areas between pits are known as "lands". A motor within the CD player rotates the disk. The capacity of an ordinary CD-ROM is 700MB.

Fig 3.9 Compact Disc

3.6.3 Digital Versatile Disc (DVD)

A **DVD (Digital Versatile Disc or Digital Video Disc)** is an optical disc capable of storing up to 4.7 GB of data, more than six times what a CD can hold. DVDs are often used to store movies at a better quality. Like CDs, DVDs are read with a laser.

The disc can have one or two sides, and one or two layers of data per side; the number of sides and layers determines how much it can hold. A 12 cm diameter disc with single sided, single layer has 4.7 GB capacity, whereas the single sided, double layer has 8.5 GB capacity. The 8 cm DVD has 1.5 GB capacity. The capacity of a DVD-ROM can be visually determined by noting the number of data sides of the disc. Double-layered sides are usually gold-coloured, while single-layered sides are usually silver-coloured, like a CD.

Fig 3.10 Digital Versatile Disc

3.6.4 Flash Memory Devices

Flash memory is an electronic (solid-state) non-volatile computer

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storage medium that can be electrically erased and reprogrammed. They are either EEPROM or EPROM. Examples for Flash memories are pendrives, memory cards etc. Flash memories can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones. Flash memory offers fast access times. The time taken to read or write a character in memory is called access time. The capacity of the flash memories vary from 1 Gigabytes (GB) to 2 Terabytes (TB). A sample of flash memory is shown in Figure 3.11.

Figure 3.11 Flash Memory

3.6.5 Blu-Ray Disc

Blu-Ray Disc is a high-density optical disc similar to DVD. Blu-ray is the type of disc used for PlayStation games and for playing High-Definition (HD) movies. A double-layer Blu-Ray disc can store up to 50GB (gigabytes) of data. This is more than 5 times the capacity of a DVD, and above 70 times of a CD. The format was developed to enable recording, rewriting and playback of high-definition video, as well as storing large amount of data. DVD uses a red laser to read and write data. But, Blu-ray uses a blue-violet laser to write. Hence, it is called as Blu-Ray.

Fig 3.12 Blu- Ray Disc

3.7 Ports and Interfaces

The Motherboard of a computer has many I/O sockets that are connected to the ports and interfaces found on the rear side of a computer (Figure 3.13). The external devices can be connected to the ports and interfaces. The various types of ports are given below:

Serial Port: To connect the external devices, found in old computers.

Parallel Port: To connect the printers, found in old computers.

USB Ports: To connect external devices like cameras, scanners, mobile phones, external hard disks and printers to the computer.

USB 3.0 is the third major version of the Universal Serial Bus (USB) standard to connect computers with other electronic gadgets as shown in Figure 3.13. USB 3.0 can transfer data up to 5 Giga byte/second. USB3.1 and USB 3.2 are also released.

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Figure 3.13 USB 3.0 Ports

Fig 3.14 Ports and Interfaces

VGA Connector: To connect a monitor or any display device like LCD projector.

Audio Plugs: To connect sound speakers, microphone and headphones.

PS/2 Port: To connect mouse and keyboard to PC.

SCSI Port: To connect the hard disk drives and network connectors.

High Definition Multimedia Interface (HDMI)

High-Definition Multimedia Interface is an audio/video interface which transfers the uncompressed video and audio data from a video controller, to a compatible computer monitor, LCD projector, digital television etc.

Micro HDMI   HDMI
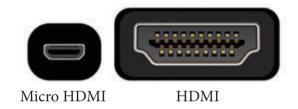
Figure 3.15 HDMI Ports

Activity

Student Activity

- Identify the components of a computer

- Connecting external devices like printer/LCD projector.

Teacher Activity

- Show the components of a computer

- Display different ROM ICs

- Display the flash memory

- Demonstrate various ports and their usage

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Evaluation

Part – I

Choose the correct answer

1. Which of the following is sadi to be the brain of a computer?

    (a) Input devices   (b) Output devices

    (c) Memory device   (d) Microprocessor

2. Which of the following is not the part of a microprocessor unit?

    (a) ALU   (b) Control unit

    (c) Cache memory   (d) register

3. How many bits constitute a word?

    (a) 8   (b) 16

    (c) 32   (d) determined by the processor used.

4. Which of the following device identifies the location when address is placed in the memory address register?

    (a) Locator   (b) encoder

    (c) decoder   (d) multiplexer

5. Which of the following is a CISC processor?

    (a) Intel P6   (b) AMD K6   (c) Pentium III   (d) Pentium IV

6. Which is the fastest memory?

    (a) Hard disk   (b) Main memory   (c) Cache memory (d) Blue-Ray dist

7. How many memory locations are identified by a processor with 8 bits address bus at a time?

    (a) 28   (b) 1024   (c) 256   (d) 8000

8. What is the capacity of 12cm diameter DVD with single sided and single layer?

    (a) 4.7 GB   (b) 5.5 GB   (c) 7.8GB   (d) 2.2 GB

9. What is the smallest size of data represented in a CD?

    (a) blocks   (b) sectors   (c) pits   (d) tracks

10. Display devices are connected to the computer through.

    (a) USB port   (b) Ps/2 port   (c) SCSI port   (d) VGA connector

Part – II

(1) What are the parameters which influence the characteristics of a microprocessor?

(2) What is an instruction?

(3) What is a program counter?

(4) What is HDMI?

(5) Which source is used to erase the content of a EPROM?

Part – III

(1) Differentiate Computer Organization from Computer Architecture.

(2) Classify the microprocessor based on the size of the data.

(3) Write down the classifications of microprocessors based on the instruction set.

(4) Differentiate PROM and EPROM.

(5) Write down the interfaces and ports available in a computer.

(6) Differentiate CD and DVD

(7) How will you differentiate a flash memory and an EEPROM?

Part – IV

(1) Explain the characteristics of a microprocessor.

(2) How the read and write operations are performed by a processor? Explain.

(3) Arrange the memory devices in ascending order based on the access time.

(4) Explain the types of ROM.

Computer hardware	The physical parts or components of a computer, such as the CPU, mother board, monitor, keyboard, etc.
Intel	Intel Corporation is an American multinational corporation and technology company involving in hardware manufacturing, especially mother board and processors
Silicon chip	Silicon chip is an integrated , set of electronic circuits on one small flat piece of semiconductor material, silicon.
Multipurpose	Multipurposeis several purpose
Address bus	Address bus is a collection of wires that carry the address as bits
Data bus	Data bus is a collection of wires to carry data in bits
Control bus	Control bus is a control line/collection of wires to control the operations/functions
Arithmetic operations	Arithmetic operations are the mathematical operations on data like add, subtract etc
Data Transfer	Data Transfer means moving data from one component to another
Logical operations	Logical operations are the operations on binary/Boolean data like AND, OR , NOT
Bidirectional	Bidirectional means both the directions/ways
Unidirectional	Unidirectional means only one direction
Access time	Access time is the time delay or latency between a request to an electronic system, and the access being completed or the requested data returned

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Theoretical concepts of Operating System

Learning objectives

✓ To know the concept of Operating Systems and their types.

✓ To acquire the basic Knowledge of Operating Systems and its functions.

4.1 Introduction to Software

A software is set of instructions that perform specific task. It interacts basically with the hardware to generate the desired output.

4.1.1 Types of Software

Software is classified into two types:

1) Application Software
2) System Software

Application Software:

Application software is a set of programs to perform specific task. For example MS-word is an application software to create text document and VLC player is familiar application software to play audio, video files and many more.

System Software:

System software is a type of computer program that is designed to run the computer's hardware and application programs. For example Operating System and Language Processor
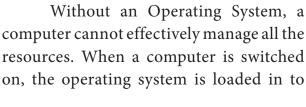
4.2 Introduction to Operating System (OS):

An Operating System (OS) is a system software which serves as an interface between a user and a computer.

This controls input, output and other peripheral devices such as disk drives, printers and electronic gadgets. The functions of an Operating System include file management, memory management, process management and device management and many more.

Figure: 4.1 Operating System

Without an Operating System, a computer cannot effectively manage all the resources. When a computer is switched on, the operating system is loaded in to

the memory automatically. A user cannot communicate directly with the computer hardware, unless an operating system is loaded.

Some of the popular Operating Systems used in personal computers and laptops are **Windows**, **UNIX** and **Linux**. The mobile devices mostly use Android and ioS as mobile **OS.**

4.2.1 Need for Operating System

Operating System has become essential to enable the users to design applications without the knowledge of the computer's internal structure of hardware. Operating System manages all the Software and Hardware. Most of the time there are many different computer programmes running at the same time, they all need to access the Computers, CPU, Memory and Storage. The need of Operating System is basically - it is the interface between the user and hardware.
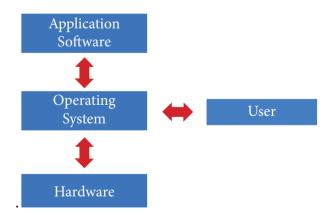
Figure: 4.2 Interaction of Operating system and user

Operating System works as translator, while it translates the user request into machine language(Binary language), processes it and then sends it back to Operating System. Operating System converts processed information into user readable form

Uses of Operating Systems

The following are few uses of Operating System

The main use of Operating System is

⚑ to ensure that a computer can be used do to exact if what the user wants it do.

⚑ Easy interaction between the users and computers.

⚑ Starting computer operation automatically when power is turned on (Booting).

⚑ Controlling Input and Output Devices

⚑ Manage the utilization of main memory.

⚑ Providing security to user programs.

4.3 Types of Operating System

Operating System are classified into the following types depending on their processing capabilities.

4.3.1 Single User Operating Systems

An operating system allows only a single user to perform a task at a time. It is called as a Single user and single Task operating system. For a user, a task is a function such as printing a document,

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writing a file to disk, editing a file or downloading a file etc. MS-DOS is an example for a single user and single task Operating System.

4.3.2 Multi-user Operating Systems

It is used in computers and laptops that allow same data and applications to be accessed by multiple users at the same time. The users can also communicate with each other. Windows, Linux and UNIX are examples for multi-user Operating System.

DO YOU KNOW? Build a cheap computer with raspbion OS and a Raspberry Pi. raspbion OS is a platform that's designed to teach how to build a computer, what every part of a circuit board does, and finally how to code apps or games. The platform is available in pre-designed kits

4.4 Key features of the Operating System

The various key features are given below
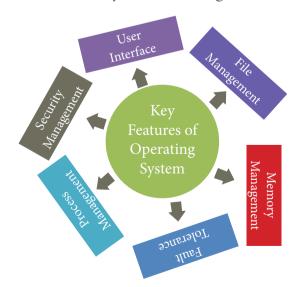
Figure: 4.3 Key Features of the Operating System

4.4.1 User Interface (UI)

User interface is one of the significant feature in Operating System. The only way that user can make interaction with a computer. If the computer interface is not user-friendly, the user slowly reduces the computer usage from their normal life. This is a main reason for key success of GUI (Graphical User Interface) based Operating System. The GUI is a window based system with a pointing device to direct I/O, choose from menus, make selections and a keyboard to enter text.Its vibrant colours attract the user very easily. Beginners are impressed by the help and pop up window message boxes. Icons are playing vital role of the particular application.

Now Linux distribution is also available as GUI based Operating System. The following points are considered when User Interface is designed for an application.

1. The user interface should enable the user to retain this expertise for a longer time.

2. The user interface should also satisfy the customer based on their needs.

3.The user interface should save user's precious time. Create graphical elements like Menus,Window,Tabs, Icons andreduce typing work will be an added advantage of the Operating System.

4. The ultimate aim of any product is to satisfy the customer. The User Interface is also to satisfy the customer.

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5. The user interface should reduce number of errors committed by the user with little practice the user should be in a position to avoid errors (Error Log File)

4.4.2 Memory Management

Memory Management is the process of controlling and coordinating computer's main memory and assigning memory block (space) to various running programs to optimize overall computer performance. The Memory management involves the allocation of specific memory blocks to individual programs based on user demands. At the application level, memory management ensures the availability of adequate memory for each running program at all times.

The objective of Memory Management process is to improve both the utilization of the CPU and the speed of the computer's response to its users via main memory. For these reasons the computers must keep several programs in main memory that associates with many different Memory Management schemes.

The Operating System is responsible for the following activities in connection with memory management:

- Keeping track of which portion of memory are currently being used and who is using them.

- Determining which processes (or parts of processes) and data to move in and out of memory.

- Allocation and de-allocation of memory blocks as needed by the program in main memory. (Garbage Collection)

4.4.3 Process management

Process management is function that includes creating and deleting processes and providing mechanisms for processes to communicate and synchronize with each other.

A process is the unit of work (program) in a computer. A word-processing program being run by an individual user on a computer is a process. A system task, such as sending output to a printer or screen, can also be called as a Process.

A computer consists of a collection of processes, they are classified as two categories:

- Operating System processes which is executed by system code

- User Processes which is execute by user code

All these processes can potentially execute concurrently on a single CPU.

A process needs certain resources including CPU time, memory, files and I/O devices to finish its task.

The Operating System is responsible for the following activities associated with the process management:

- Scheduling processes and threads on the CPUs

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- Creating and deleting both user and system processes

- Suspending and resuming processes

- Providing mechanisms for process synchronization

- Providing mechanisms for process communication

The following algorithms are mainly used to allocate the job (process) to the processor.

1. FIFO　　2. SJF　　3. Round Robin

4. Based on Priority

FIFO (First In First Out) Scheduling:

This algorithm is based on queuing technique. Assume that a student is standing in a queue (Row) to get grade sheet from his/her teacher. The other student who stands first in the queue gets his/her grade sheet first and leaves from the queue (Row). Followed by the next student in the queue gets it corrected and so on. This is the basic logic of the FIFO algorithm.

Technically, the process that enters the queue first is executed first by the CPU, followed by the next and so on. The processes are executed in the order of the queue (row).

SJF (Shortest Job First) Scheduling:

This algorithm works based on the size of the job being executed by the CPU.

Consider two jobs A and B.

1)　A = 6 kilo bytes　　2) B = 9 kilo bytes

First the job "A" will be assigned and then job "B" gets its turn.

Round Robin Scheduling

The Round Robin (RR) scheduling algorithm is designed especially for time sharing systems. Jobs (processes) are assigned and processor time in a circular method. For example take three jobs A, B, C. First the job A is assigned to CPU then job B and job C and then again A, B and C and so on.

Based On Priority

The given job (process) is assigned based on a Priority. The job which has higher priority is more important than other jobs. Take two jobs A and B. Let the priority of A be 5 and priority B be 7.

Job B is assigned to the processor before job A.

4.4.4 Security Management

The major challenge in computer and software industry is to protect user's legitimate data from hackers. The Operating System provides three levels of securities to the user end. They are

(1)　File access level

(2)　System level

(3)　Network level

In order to access the files created by other people, you should have the access permission. Permissions can either

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be granted by the creator of the file or bythe administrator of the system.

System level security is offered by the password in a multi-user environment.

Both windows and Linux offer the password facility.

Network security is an indefinable one. So people from all over the world try to provide such a security.

All the above levels of security features are provided only by the Operating System.

4.4.5 Fault Tolerance

The Operating Systems should be robust. When there is a fault, the Operating System should not crash, instead the Operating System have fault tolerance capabilities and retain the existing state of system.

4.4.6 File Management

File management is an important function of OS which handles the data storage techniques. The operating System manages the files, folders and directory systems on a computer. Any type of data in a computer is stored in the form of files and directories/folders through File Allocation Table (FAT). The FAT stores general information about files like filename, type (text or binary), size, starting address and access mode (sequential/indexed / indexed-sequential/ direct/relative). The file manager of the operating system helps to create, edit, copy, allocate memory to the files and also

updates the FAT. The OS also takes care of the files that are opened with proper access rights to read or edit them. There are few other file management techniques available like Next Generation File System (NTFS) and ext2(Linux).

4.4.7 Multi-Processing

This is a one of the features of Operating System. It has two or more processors for a single running process (job). Processing takes place in parallel is known as parallel processing. Each processor works on different parts of the same task or on two or more different tasks. Since the execution takes place in parallel, this feature is used for high speed execution which increases the power of computing.

4.4.8 Time-sharing

This is a one of the features of Operating Systems. It allows execution of multiple tasks or processes concurrently. For each task a fixed time is allocated. This division of time is called Time- sharing. The processor switches rapidly between various processes after a time is elapsed or the process is completed.

For example assume that there are three processes called P1, P2, P3 and time allocated for each process 30, 40, 50 minutes respectively. If the process P1 completes within 20 minutes then processor takes the next process P2 for the execution. If the process P2 could not complete within 40 minutes, then the current process P2 will be paused and switch over to the next process P3.

4.4.9 Distributed Operating Systems

This feature takes care ofthe data and application that are stored and processed on multiple physical locations across the world over the digital network (internet/intranet). The Distributed Operating System is used to access shared data and files that reside in any machine around the world. The user can handle the data from different locations. The users can access as if it is available on their own computer.

The advantages of distributed Operating System are as follows:

- A user at one location can make use of all the resources available at another location over the network.

- Many computer resources can be added easily in the network

- Improves the interaction with the customers and clients.

- Reduces the load on the host computer.

Figure: 4.4 Distributed Operating Systems

4.5 Prominent Operating Systems

Prominent OS are as follows:

- UNIX

- Microsoft Windows

- Linux

- iOS

- Android

Modern operating systems use a Graphical User Interface(GUI). A GUI lets you use your mouse to click icons, buttons, menus and everything is clearly displayed on the screen using a combination of graphics and text elements.

OS can be either proprietary with a commercial license or can be open source.

Each Operating System's GUI has a different look and feel, so if you switch to a different Operating System, it may seem unfamiliar at first. However, modern Operating Systems are designed to be ease of use and most of the basic principles are the same.

Figure: 4.5 Various Operating Systems

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                    ┌─────────────────────────┐
                    │    Operating System     │
                    └─────────────────────────┘
                         ↓             ↓
            ┌─────────────────┐  ┌─────────────────┐
            │ Proprietary Licence │  │ Open source Free │
            │                 │  │     licence      │
            └─────────────────┘  └─────────────────┘
                     ↓                    ↓
```

Proprietary Licence	Open source Free licence
• Microsoft windows • Apple Mac OS • Apple iOS [Mobile Device]	• UNIX • LINUX • Google's Android [Mobile Device]
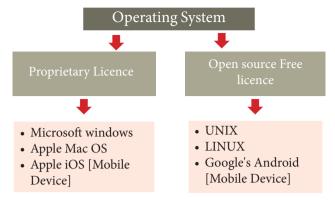
Figure: 4.6 Classification of Operating Systems according to availability

4.5.1 UNIX

UNIX is a family of multitasking, multi-user operating systems that derive originally from AT&T Bell Labs, where the development began in the 1970s by Ken Thompson and Dennis Ritchie.

4.5.2 Linux

Linux is a family of open-source operating systems. It can be modified and distributed by anyone around the world. This is different from proprietary software like Windows, which can only be modified by the company that owns it. The main advantage of Linux operating system is that it is open source. There are many versions and their updates. Most of the servers run on Linux because it is easy to customize.

Figure: 4.7 LINUX Ubuntu Operating System

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There are a few different distributions of Linux, like Ubuntu, Mint, Fedora, RedHat, Debian, Google's Android, Chrome OS, and Chromium OS which are popular among users.

The Linux operating system was originated in 1991, as a project of "Linus Torvalds" from a university student of Finland. He posted information about his project on a news group for computer students and programmers. He received support and assistance from a large pool of volunteers who succeeded in creating a complete and functional Operating System. Linux is similar to the UNIX operating system.

> **DO YOU KNOW?** Unix and the C programming language were developed by AT&T and distributed to government and academic institutions, which led to both being ported to a wider variety of machine families than any other operating system.

4.5.3 Microsoft Windows

Microsoft Windows is a family of proprietary operating systems designed by Microsoft Corporation and primarily targeted to Intel and AMD architecture based computers.

> **DO YOU KNOW?** ReactOS is a Windows-alternative open source operating system, which is being developed on the principles of Windows - without using any of Microsoft's code.

Figure: 4.8 Linux Distributions
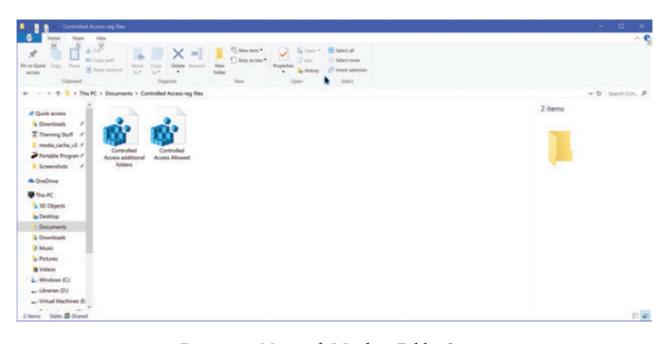
Figure: 4.9 Microsoft WindowsFolder Screen

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Figure: 4.10 Microsoft Windows Home Screen

4.5.4 Operating systems for mobile devices

Mobile devices such as phones, tablets and MP3 players are different from desktop and laptop computers and hence they need special Operating Systems. Examples of mobile Operating Systems are Apple iOS and Google Android. The iOS running on an iPad is shown in Figure 4.12.

Figure: 4.11 Various Mobile Devices

Operating systems for mobile devices generally are not as fully featured as those made for desktop and laptop computers and they are not able to run all software.

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4.5.5 Android

Android is a mobile operating system developed by Google, based on Linux and designed primarily for touch screen mobile devices such as smart phones and tablets. Google has further developed Android TV for televisions, Android Auto for cars and Android Wear for wrist watches, each with a specialized user interface. Variants of Android are also used on game consoles, digital cameras, PCs and other electronic gadgets.

Figure: 4.12 Android Mobile Open Source versions

4.5.6 iOS - iPhone OS

iOS (formerly iPhone OS) is a mobile Operating System created and developed by Apple Inc., exclusively for its hardware. It is the Operating System that presently powers many of the company's mobile devices, including the iPhone, iPad and iPod Touch. It is the second most popular mobile Operating System globally after Android.

Figure: 4.13 iOS - iPhone Home Screen

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4.6 Student Activity

Activity 1: Draw a line between the operating system logo and the correct description.

A command-line operating system is an example of Open Source software development and Free Operating System
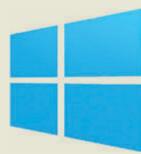
Is an Operating System that is very popular in universities, companies, bigenterprises etc

A popular Operating System for mobile phone technology which is not linked with Apple products.

UNIX

Used with Apple computers and works well with cloud computing.

Designed to be used for the Apple iPhone

Mac OS

The most popular GUI Operating System for personal computers.

Activity 2: Discuss and provide the suitable answers for the questions below.

One of the functions of an Operating System is multi-tasking

1) Explain one reason why multi-tasking is needed in an operating system

2) State two other function of an Operating System

4.7 Teacher Activity:

1. Install two different Operating Systems in a single computer.

2. Create a virtual Operating System using virtualization software.
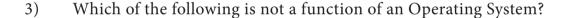
Evaluation

Part I

1)   Operating system is a

A)Application Software   B) Hardware   C)System Software   D)Component

2)   Identify the usage of Operating Systems

A)Easy interaction between the human and computer

B)Controlling input & output Devices

C)Managing use of main memory

D)All the above

3)   Which of the following is not a function of an Operating System?

A)Process Management   B)Memory Management

C)Security management   D)Complier Environment

4)   Which of the following OS is a Commercially licensed Operating system?

A)Windows   B)UBUNTU   C)FEDORA   D)REDHAT

5)   Which of the following Operating systems support Mobile Devices?

A)Windows 7   B)Linux   C)BOSS   D)iOS

6)   File Management manages

A)Files   B)Folders   C)Directory systems   D)All the Above

7)   Interactive Operating System provides

A)Graphics User Interface (GUI)   B)Data Distribution

C)Security Management   D)Real Time Processing

8)   Android is a

A)Mobile Operating system   BOpen Source

C)Developed by Google   D)All the above

9)   Which of the following refers to Android operating system's version?

A)JELLY BEAN   B)UBUNTU   C)OS/2   D)MITTIKA

Part II

1)   What are the advantages of memory management in Operating System?

2)   What is the multi-user Operating system?

3)   What is a GUI?

4)   List out different distributions of Linux operating system.

5)   What are the security management features available in Operating System ?

6)   What is multi-processing?

7)   What are the different Operating Systems used in computer?

Part III

1)   What are the advantages and disadvantages of Time-sharing features?

2)   Explain and List out examples of mobile operating system.

3)   What are the differences between Windows and Linux Operating system?

4)   Explain the process manangement algorithms in Operating System.

Part IV

1)   Explain the concept of a Distributed Operating System.

2)   Explain the main purpose of an operating system.

3)   Explain advantages and disadvantages of open source operating systems.

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Part - I : Working with Windows 7

Learning Objectives

After learning the concepts in this chapter, the students will be able

- To know the concepts of Operating System.

- To know the versions of the windows operating system.

- To know the concepts like desktop and the elements of window.

- To explore the document window.

- To compare the different types of icons.

- To explore the windows directory structure.

- To practice creating files and folders in specific drives.

- To manage the files and folders.

- To know the procedure to start and shutdown the computer.

5.1. Introduction to Operating System

An Operating System (OS) is a system software (Figure 5.1) that enables the hardware to communicate and operate with other software. It also acts as an interface between the user and the hardware and controls the overall execution of the computer.
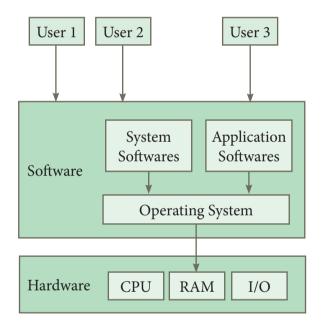
Figure 5.1. Overview of an Operating System

Following are some of the important functions of an Operating System as discussed in the previous chapter:

- Memory Management

- Process Management

- Device Management

- File Management

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- Security Management

- Control overall system performance

- Error detecting aids

- Coordination between other software and users

The most popular Operating System are as follows:

- Windows Series - for desktop and laptop computers.

- Android - for smart phones.

- iOS - for Apple phones, i-Pad and i-Pod.

- Linux - Open source Operating System for desktop and server.

5.2. Introduction to Windows Operating System

Every computer needs an Operating System to function. Microsoft Windows is one of the most popular Graphical User Interface (GUI). Multiple applications can execute simultaneously in Windows, and this is known as **"Multitasking".**

5.3. Various versions of Windows

Windows Operating System uses both Keyboard and mouse as input devices. Mouse is used to interact with Windows by clicking its icons. Keyboard is used to enter alphabets, numerals and special characters.

Some of the functions of Windows Operating System are:

- Access applications (programs) on the computer (word processing, games, spread sheets, calculators and so on).

- Load any new program on the computer.

- Manage hardware such as printers, scanners, mouse, digital cameras etc.,

- File management activities (For example creating, modifying, saving, deleting files and folders).

- Change computer settings such as colour scheme, screen savers of your monitor, etc.

With reference to the Table 5.1, let us see the versions of Windows Operating System.

Versions	Logo	Year	Specific features
Windows 1.x		1985	• Introduction of GUI in 16 - bit. processor • Mouse was introduced as an input device.
Windows 2.x		1987	• Supports to minimize or maximize windows. • Control panel feature was introduced with various system settings and customising options.
Windows 3.x		1992	• Introduced the concept of multitasking. • Supported 256 colours which brought a more modern, colourful look to the interface.

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Windows 95		1995	• Introduced Start button, the taskbar, Windows Explorer and Start menu. • Introduced 32 - bit processor and focused more on multitasking.
Windows 98		1998	• Integration of the Web browser (Internet Explorer) with the Operating System. • DOS gaming began to disappear as Windows based games improved. • Plug and play feature was introduced.
Windows NT			• Designed to act as servers in network.
Windows Me		2000	• It introduced automated system diagnostics and recovery tools.
Windows 2000		2000	• Served as an Operating System for business desktop and laptop systems. • Four versions of Windows 2000 were released: Professional (for business desktop and laptop systems), Server (both a Web server and an office server), Advanced Server (for line-of-business applications) and Data Centre Server (for high-traffic computer networks).
Windows XP		2001	• Introduced 64-bit Processor. • Improved Windows appearance with themes and offered a stable version.
Windows Vista		2006	• Updated the look and feel of Windows.

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Windows 7		2009	• Booting time was improved, introduced new user interfaces like Aero Peek, pinning programs to taskbar, handwriting recognition etc. and Internet Explorer 8.
Windows 8		2012	• Windows 8 was faster than previous versions of Windows. • Start button was removed. • Windows 8 takes better advantage of multi-core processing, solid state drives (SSD), touch screens and other alternate input methods. • Served as common platform for mobile and computer.
Windows 10		2015	• Start Button was added again. • Multiple desktop. • Central Notification Center for App notification and quick actions. • Cortana voice activated personal assistant.

Table 5.1 Versions of Windows Operating System.

5.4. Handling the mouse

Before learning Window Operating System, you should know more about mouse and its actions.
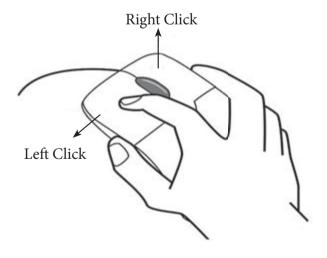
Figure 5.2.Mouse actions

The following are the mouse actions:

Action	Reaction
Point to an item	Move the mouse pointer over the item.
Click	Point to the item on the screen, press and release the left mouse button.
Right click	Point to the item on the screen, press and release the right mouse button. Clicking the right mouse button displays a pop up menu with various options.
Double-click	Point to the item on the screen, quickly press twice the left mouse button.
Drag and drop	Point to an item then hold the left mouse button as you move the pointer and when you have reached the desired position, release the mouse button.

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5.5. Windows Desktop

The opening screen of Windows is called "Desktop".

The desktop of your computer may look different from what is seen in Figure 5.3.

This is because Windows allows you to change the appearance of the desktop.

In Figure 5.3, the desktop shows the Start button, Taskbar, Notification Area and date and time.

5.5.1. The Icons

Icon is a graphic symbol representing the window elements like files, folders, shortcuts etc., Icons play a vital role in GUI based applications.

5.5.1.1.Standard Icons

The icons which are available on desktop by default while installing Windows OS are called standard icons. The standard icons available in all Windows OS are My Computer, Documents and Recycle Bin.

DO YOU KNOW? You can move to the Desktop any time by pressing the Winkey + D or using Aero Peek while working in any application. You can see Figure 5.4 to know where Aero peek lies in the Taskbar.

Figure 5.3. Microsoft Windows 7 Desktop

Aero peek button

Figure 5.4. Aero peek button

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5.5.1.2. Shortcut Icons:

Shortcut icons can be created for any application or file or folder. By double clicking the icon, the related application or file or folder will open. This represents the shortcut to open a particular application. (Figure5.5)

5.5.1.3. Disk drive icons:

The disk drive icons graphically represent five disk drive options. (i) Hard disk (ii) CD-ROM/DVD Drive (iii) Pen drive (iv) Other removable storage such as mobile, smart phone, tablet etc., (v) Network drives if your system is connected with other system. (Figure 5.6)

Application Icon

Folder Icon

Figure 5.5.The types of Icons

Various Disk drive icons

Hard disk drives with total and remaining space available

Removable Storage (pen drive)
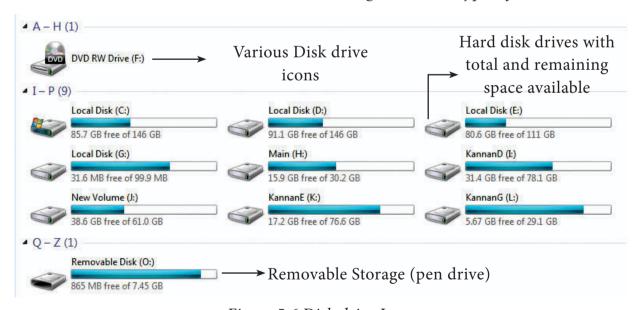
Figure 5.6.Disk drive Icons

5.6. The Window

Window is a typical rectangular area in an application or a document. It is an area on the screen that displays information for a specific program.

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5.7. Application Window

It is an area on a computer screen with defined boundaries, and within which information is displayed. Such windows can be resized, maximized, minimized, placed side by side, overlap, and so on.

An Application Window contains an open application i.e. current application such as Word or Paint. When two or more windows are open, only one of them is active and the rest are inactive. Figures 5.7 and 5.8 display the Application Window of OpenOffice Writer and the appearance of the Multiple Windows opened (overlapped) in the Desktop.

5.8. Document Window

A document window is a section of the screen used to display the contents of a document. Figure 5.9 is an example of a document window.

Note

When you open any application, such as OpenOffice Writer, OpenOffice Impress or OpenOffice Calc etc., you will find two Windows on the screen. The larger Window is called the Application Window. This Window helps the user to communicate with the Application program. The smaller window, which is inside the Application Window, is called the Document window. This Window is used for typing, editing, drawing, and formatting the text and graphics.

Title bar with title of the document

Menu bar

Tools bar

Window Control buttons

Application work area

Scroll bars
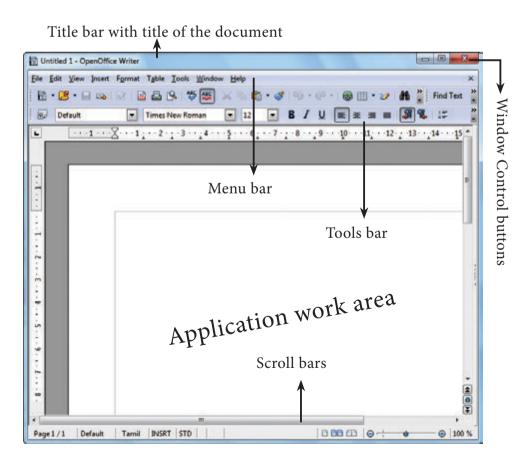
Figure 5.7. Application Window

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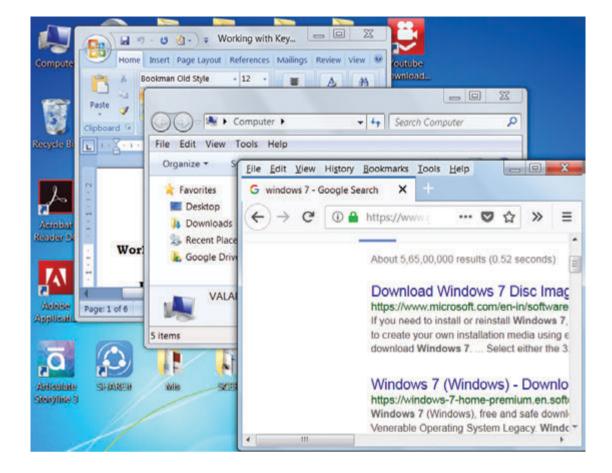
Figure 5.8. Multiple Windows opened in Desktop
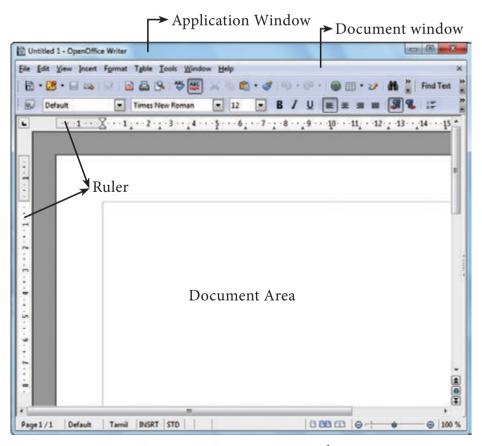
Figure 5.9.Document Window

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5.9. Elements of a window

Figure 5.10 helps to understand the elements of a window.

5.9.1. Title Bar – The title bar will display the name of the application and the name of the document opened. It will also contain minimize, maximize and close button.
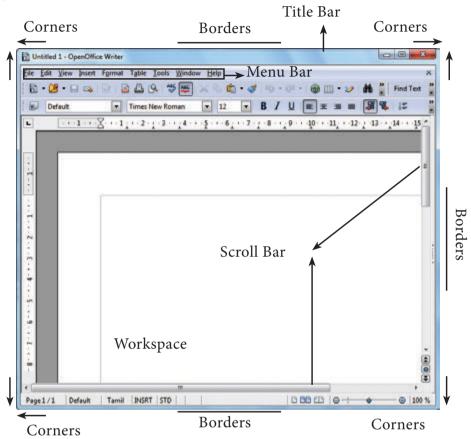
Figure 5.10 The elements of a window.

5.9.2 Menu Bar

The menu bar is seen under the title bar. Menus in the menu bar can be accessed by pressing Alt key and the letter that appears underlined in the menu title. Additionally, pressing Alt or F10 brings the focus on the first menu of the menu bar.

In Windows 7, in the absence of the menu bar, click **Organize** and from the drop down menu, click the **Layout** option and select the desired item from that list.

Figure 5.11. To display Menu Bar

Figure 5.11 helps to understand how to make menu bar visible in its absence.

5.9.3. The Workspace

The workspace is the area in the document window to enter or type the text of your document. Figure 5.10 Shows the workspace area in the document window.

5.9.4. Scroll bars - The scroll bars are used to scroll the workspace horizontally or vertically. Figure 5.10 shows the Scroll bars.

5.9.5. Corners and borders

The corners and borders of the window helps to drag and resize the windows. The mouse pointer changes to a double headed arrow when positioned over a border or a corner. Drag the border or corner in the direction indicated by the double headed arrow to the desired size as shown in Figure 5.10. The window canbe resized by dragging the corners diagonally across the screen.

5.10. Explore the Computer

5.10.1. Start Menu

In the lower left-hand corner of the windows screen is the Start button. When you click on the button, the Start menu will appear. Using the start menu, you can start any application.
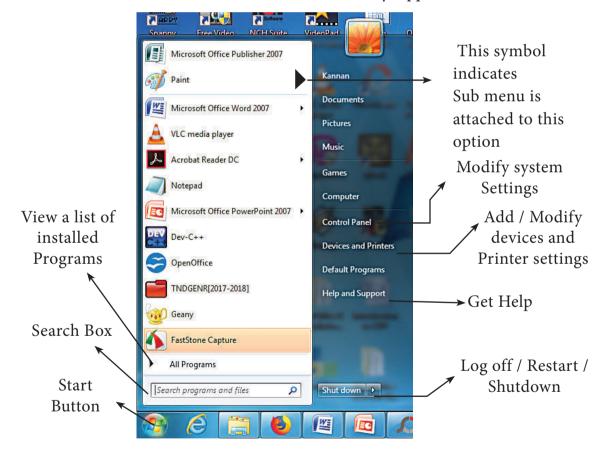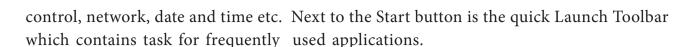
Figure 5.12 - Start Menu

Taskbar

At the bottom of the screen is a horizontal bar called the taskbar. This bar contains (from left to right) the Start button, shortcuts to various programs, minimized programs and in the extreme right corner you can see the system tray which consist of volume

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control, network, date and time etc. Next to the Start button is the quick Launch Toolbar which contains task for frequently   used applications.
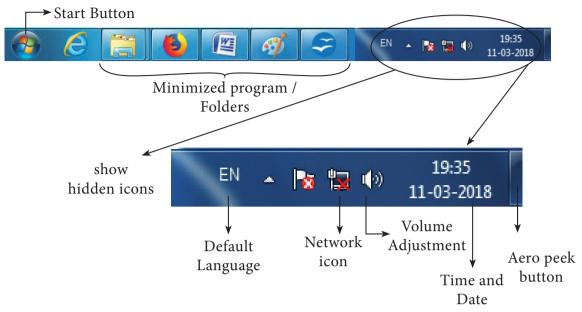
Figure 5.13.Taskbar

5.10.2. Computer Icon

By clicking this icon, the user can see the disk drivers mounted in the system. In windows XP, Vista, this icon is called "My computer" in Windows 8 and 10, it is called "This PC". The functionality of computer icon reamins the same in all versions of windows as shown in Figure 5.14.

5.10.3. Starting and Closing Applications

Most of the applications installed on your computer are available through the start menu. Depending on the system setup, the applications in the Start menu varies. To start an application:

1. Click the Start button and then point to All Programs. The Program menu appears. (Figure 5.15)

2. Point to the group that contains the application you want to start, and then click the application name.
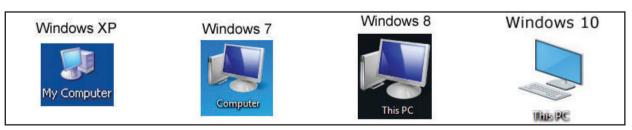
Figure 5.14. Computer icon in versions of Windows OS

77
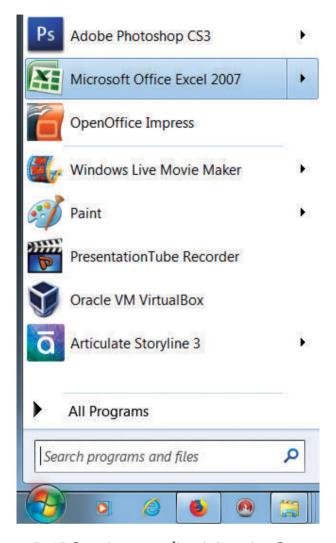
Figure 5. 15.Starting a applicatioin using Start menu

3. You can also open an application by clicking Run on the Start menu, and the name of the application. (Figure 5.16)
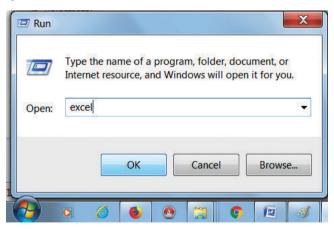
Figure 5.16.Starting a program using Run option

4. To quit a application, click the Close button in the upper right corner of the application window. (Figure 5.17)

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Close button
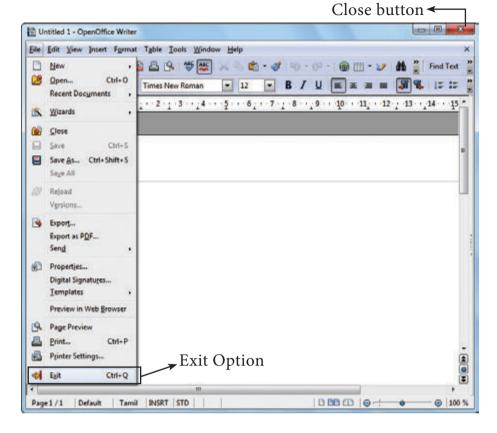
Figure 5.17.Closing the application using Close button and Exit option

5. You can also quit an application by clicking on File → Exit and File → Close option in Windows 7. (Figure 5.17)

Workshop

1. ◆ Start the application Wordpad using Start menu and Run option.

   ◆ Close the Wordpad application using File menu.

5.11. Managing Files and Folders

In Windows 7, you can organize your documents and programs in the form of files and folders. You can move, copy, rename, delete and search the files and folders.

5.11.1. Creating files and Folders

5.11.1.1 Creating Folders

You can store your files in many locations – on the hard disk or in other devices. To better organise your files, you can store them in folders.

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There are two ways in which you can create a new folder:

Method I:

Step 1: Open **Computer Icon**.

Step 2: Open any drive where you want to create a new folder. (For example select D:)

Step 3: Click on File → New → Folder.

Step 4: A new folder is created with the default name "New folder". (Figure 5.19)

Step 5: Type in the folder name and press Enter key. (Figure 5.20 shows the newly created Folder named "Test Folder ").

Figure 5.18. Creating a Folder using File menu
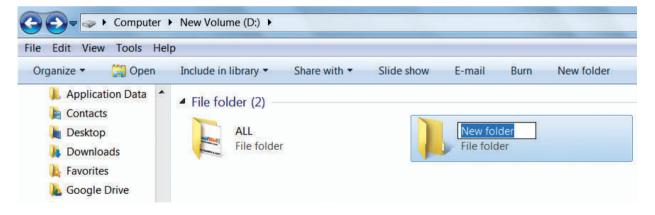
Figure 5.19. New Folder created with the default name
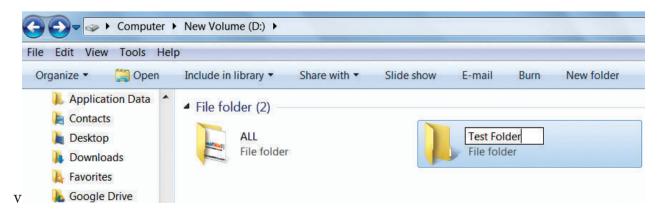
Figure 5.20. Renaming the new Folder

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Method II:

In order to create a folder in the desktop:

Step 1: In the Desktop, right click → New → Folder. (Figure 5.21 Shown the procedure)

Step 2: A Folder appears with the default name "New folder" and it will be highlighted as shown in the Figure 5.22.

Step 3: Type the name you want and press Enter Key.

Step 4: The name of the folder will change.

Workshop

2. Create a Folder in My Documents with your name using any one of the methods discussed.

5.11.1.2 Creating Files (Wordpad)

Wordpad is an in-built word processor application in Windows OS to create and manipulate text documents.

In order to create files in wordpad you need to follow the steps given below.

Figure 5.21. Creating a folder in the desktop

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1. Click Start → All Programs → Accessories → Wordpad or Run → type Wordpad, click OK. Wordpad window will be opened as shown in Figure 5.23.

2. Type the contents in the workspace and save the file using File → Save or Ctrl + S.

3. Save As dialog box will be opened.

4. In the dialog box, select the location where you want to save the file by using **look in** drop down list box.

5. Type the name of the file in the **file name** text box.

6. Click save button.

Figure 5.22 New folder icon on the dektop

Workshop

3. Open the Wordpad application and save it under a folder created with your name in My Documents.

5.11.2. Finding Files and Folders

You can use the **search** box on the **Start** menu to quickly search a particular folder or file in the computer or in a specific drive.

To find a file or folder:

1. Click the **Start** button, the **search** box appears at the bottom of the start menu.

2. Type the name of the file or the folder you want to search. Even if you give the part of the file or folder name, it will display the list of files or folders starting with the specified name. (Figure 5.24)

3. The files or the folders with the specified names will appear, if you click that file, it will directly open that file or the folder.

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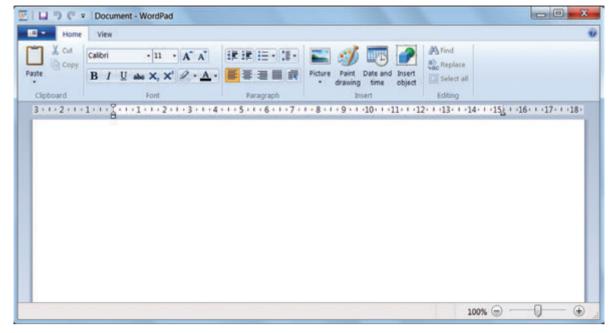
Figure 5.23. Wordpad - Word Processor application

4. There is another option called "**See more results**" which appears above the **search** box.

5. If you click it, it will lead you to a **Search Results** dialog box where you can click and open that file or the folder.

Searching Files or folders using Computer icon

1. Click **Computer Icon** from desktop or from **Start menu**.

2. The Computer disk drive screen will appear and at the top right corner of that screen, there is a **search** box option. (Figure 5.25)

3. Type the name of the file or the folder you want to search. Even if you give the part of the file or folder name, it will display the list of files or folders starting with the specified name.
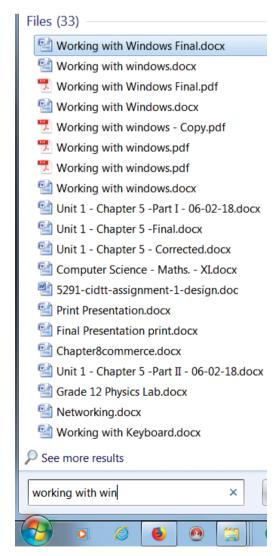
Figure 5.24. Finding a File/Folder using Start button
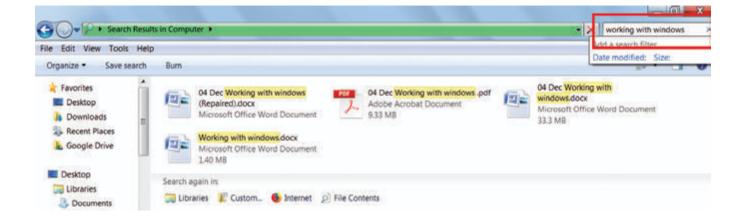
Figure 5.25. Finding a File/Folder in the Computer icon screen

4. Just click and open that file or the folder.

5.11.3. Opening existing Files or Folders

The most common way of opening a file or a Folder is to double click on it.

5.11.4. Renaming Files or Folders

There are number of ways to rename files or folders. You can rename using the File menu, left mouse button or right mouse button.

Method 1

Using the FILE Menu

1. Select the File or Folder you wish to Rename.

2. Click File→ Rename.

3. Type in the new name.

4. To finalise the renaming operation, press Enter as in Figure 5.26.

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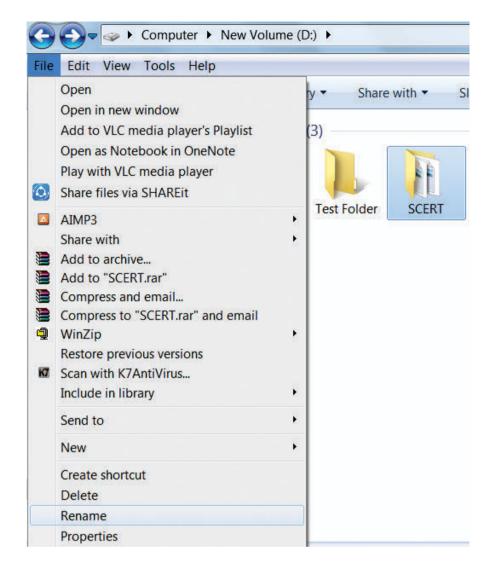
Figure 5.26. Renaming File/Folders using the File menu
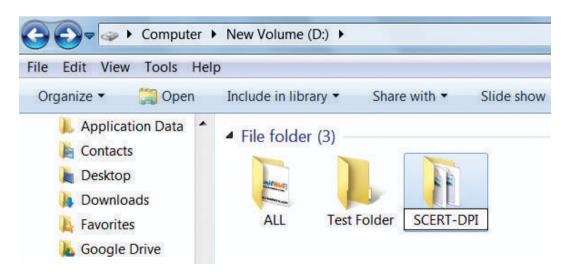
Figure 5.27.Folder renamed

Figure 5.27, you can see that the folder is renamed as SCERT-DPI from SCERT.

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Method 2

Using the Right Mouse Button

1. Select the file or folder you wish to rename.

2. Click the right mouse button over the file or folder. (Figure 5.28)

3. Select Rename from the pop-up menu.

4. Type in the new name.

5. To finalise the renaming operation, press   Enter.

6. Figure 5.29. Shows that the folder "New Folder" is renamed as C++.

Figure 5.28. Renaming File/Folders using the Right Mouse Button

Figure 5.29. New Folder is renamed as C++

Method 3

Using the Left Mouse Button

1. Select the file or folder you wish to rename.

2. Press F2 or click over the file or folder. A surrounding rectangle will appear around the name.

3. Type in the new name.

4. To finalise the renaming operation, press   Enter.

Workshop

5. Rename the file created by you using the File menu, left mouse button or right mouse button.

5.11.5. Moving/Copying Files and Folders

You can move your files or folders to other areas using variety of methods.

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Moving Files and Folders

Method I-CUT and PASTE

To move a file or folder, first select the file or folder and then choose one of the   following:

- Click on the **Edit → Cut** or **Ctrl + X** Or right **click → cut** from the pop-up menu.

- To move the file(s) or folder(s) in the new location, navigate to the new location and paste it using Click **Edit → Paste** from edit menu or **Ctrl + V** using   keyboard.

- Or Right **click → Paste** from the pop-up menu. The file will be pasted in the new location.

Method II – Drag and Drop

In the disk drive window, we have two panes called left and right panes. In the left pane, the files or folders are displayed like a tree structure. In the right pane, the files inside the specific folders in the left pane are displayed with various options.

- In the right pane of the Disk drive window, select the file or folder you want to move.

- Click and drag the selected file or folder from the right pane, to the folder list on the left pane.

- Release the mouse button when the target folder is highlighted (active).

- Your file or folder will now appear in the new area. Figure 5.30 shows how

to move files or folders using drag and drop method.

Figure 5.30.Moving the File/Folder using drag and drop

Copying Files and Folders

There are variety of ways to copy files and   folders:

Method I - COPY and PASTE

To copy a file or folder, first select the file or folder and then choose one of the   following:

- Click **Edit → Copy** or **Ctrl + C** or **right click→ Copy** from the pop-up menu.

- To paste the file(s) or folder(s) in the new location, navigate to the target location then do one of the following:

- Click **Edit → Paste** or **Ctrl + V.**

- Or **Right click → Paste** from the pop-up menu.

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Method II – Drag and Drop

- In the RIGHT pane, select the file or folder you want to copy.

- Click and drag the selected file and/or folder to the folder list on the left, and drop it where you want to copy the file and/or folder.

- Your file(s) and folder(s) will now appear in the new area.

Note

If you want to select multiple files or folders, use **Ctrl + Click.**

5.11.6. Copying Files and Folders to removable disk

There are several methods of transferring files to or from a removable disk.

- Copy and Paste

- Send To

METHOD I - Copy and Paste

- Plug the USB flash drive directly into an available USB port.

- If the USB flash drive or external drive folder does NOT open automatically, follow these steps:

- Click Start→Computer. (Figure 5.31)

Figure 5.31. Selecting Computer option from Start menu

- Double-click on the Removable Disk associated with the USB flash drive. (Figure 5.32)
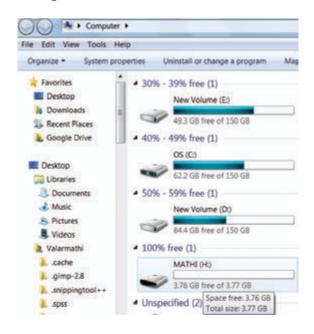
Figure 5.32. Double Clicking Removable Disk

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- Navigate to the folders in your computer containing files you want to transfer.

Right-click on the file you want to copy, then select **Copy.** (Figure 5.33)
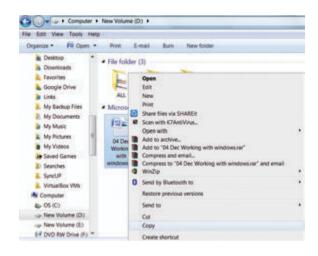
Figure 5.33. Copying File using right click

- Return to the Removable Disk window, right-click within the window, then select **Paste**. (Figure 5.34)
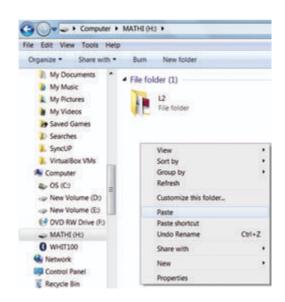
Figure 5.34. Pasting File using right click

METHOD II - Send To

- Plug the USB flash drive directly into an available USB port.

- Navigate to the folders in your computer containing files you want to transfer.

- Right-click on the file you want to transfer to your removable disk.

- Click **Send To** and select the Removable Disk associated with the USB flash drive. (Figure 5.35)

Workshop

6. ◆ Move the file created by you in My Documents to Drive D:.

◆ Copy the file created by you from drive D: to a removable disk.

5.11.7. Deleting Files and Folders

- When you delete a file or folder, it will move into the Recycle Bin.

To delete a file or folder:

Select the file or folder you wish to delete.

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↳Removable disk
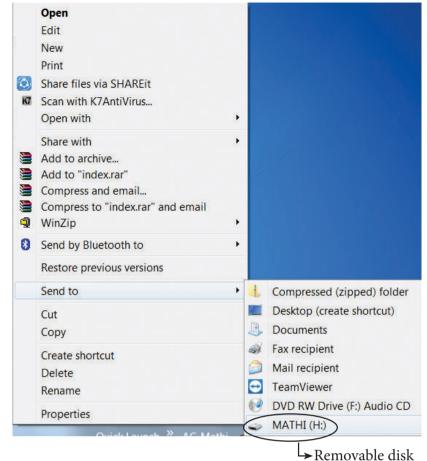
Figure 5.35. Copying File using Send to option

1. Right- click the file or folder, select **Delete** option from the po-pup menu or Click **File → Delete** or press **Delete** key from the keyboard.

2. The file will be deleted and moved to the Recycle bin.

Workshop

7. Delete the file created by you after duplicating the same under My Documents.

Note

To permanently delete a file or folder (i.e. to avoid sending a file or folder to the Recycle Bin), hold down the SHIFT key, and press **delete** on the keyboard.

Recycle Bin

Recycle bin is a special folder to keep the files or folders deleted by the user, which means you still have an opportunity to recover them. The user cannot access the files or folders available in the Recycle bin without restoring it. To restore file or folder from the Recycle Bin

• *Open Recycle bin.*

• Right click on a file or folder to be restored and select **Restore** option from the pop-up menu.

• To restore multiple files or folders, select Restore all items.

• To delete all files in the Recycle bin, select **Empty the Recycle Bin.**

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5.12. Creating Shortcuts on the Desktop

Shortcuts to your most often used folders and files may be created and placed on the Desktop to help automate your work.

- Select the file or folder that you wish to have as a shortcut on the Desktop.

- Right click on the file or folder.

- Select **Send to** from the shortcut menu, then select Desktop (create shortcut) from the sub-menu.

- A shortcut for the file or folder will now appear on your desktop and you can open it from the desktop in the same way as any other icon. Figure 5.36.
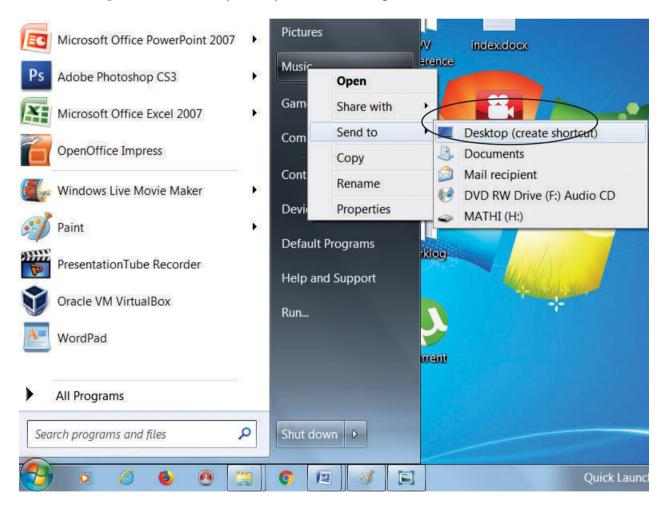
Figure 5.36 Creating Shortcut

5.13. Shutting down or Logging off a Computer

Once you have closed all open applications, you can either log off your computer or shut down the computer.

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Log Off

To Log off/Shut down the computer:
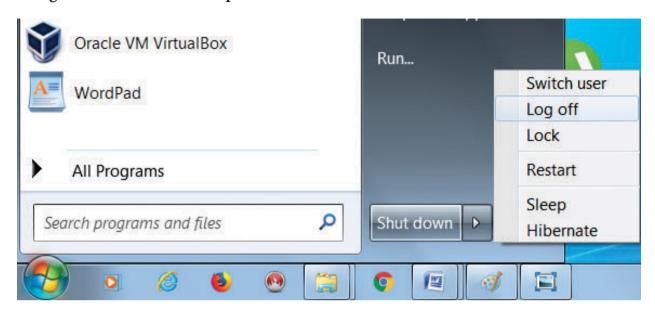
Figure 5.37. Log off option

- Click **start → log** off (click the arrow next to Shut down) or **Start → Shutdown** . (Figure 5.37.)

- If you have any open programs, then you will be asked to close them or windows will Force shut down, you will lose any un-saved information if you do this.

- **Switch User:** Switch to another user account on the computer without closing your open programs and Windows processes.

- **Log Off:** Switch to another user account on the computer after closing all your open programs and Windows processes.

- **Lock:** Lock the computer while you're away from it.

- **Restart:** Reboot the computer. (This option is often required as part of installing new software or Windows update.)

- **Sleep:** Puts the computer into a low-power mode that retains all running programs and open Windows in computer memory for a super-quick restart.

- **Hibernate** (found only on laptop computers): Puts the computer into a low-power mode after saving all running programs and open Wwindows on the machine's hard drive for a quick restart.

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Part - II : Working with Linux (Ubuntu)

Learning Objectives

- To compare Windows Operating System with Ubuntu.

- To differentiate the Window elements or icons from Ubuntu Launcher.

- To explore how to copy, delete and rename files or folders in Ubuntu.

- To explore the differences in Windows 7, Windows 8 and Windows 10.

- To compare the Windows elements between Windows 7, Windows 8 and Windows 10.

- To format Files and folders in Windows 7, Windows 8 and Windows 10.

5.14. Open Source Operating System

Open Source refers to a program or software in which the source code is available in the web to the general public free of cost.

Open Source code is typically created as a collaborative effort in which programmers continuously improve upon the source code in the web and share the changes within the community.

5.15. Linux

Linux is one of the popular Open Source versions of the UNIX Operating System. It is Open Source as its source code is freely available.

The most popular Linux server distributors are:

- Ubuntu Linux

- Linux Mint

- Arch Linux

- Deepin

- Fedora

- Debian

- CentOS

5.16. Ubuntu

Ubuntu is a Linux-based operating system. It is designed for computers, smartphones, and network servers. The system is developed by a UK based company called Canonical Ltd.

Ubuntu was conceived in 2004 by Mark Shuttleworth, a successful South African entrepreneur, and his company Canonical Ltd.

5.16.1. Significant features of Ubuntu

- The desktop version of Ubuntu supports all normal software like Windows such as Firefox, Chrome, VLC, etc.

- It supports the office suite called LibreOffice.

- Ubuntu has in-built email software called Thunderbird, which gives the user access to email such as Exchange, Gmail, Hotmail, etc.

- There are free applications for users to view and edit photos, to manage and share videos.

- It is easy to find content on Ubuntu with the smart searching facility.

- The best feature is, it is a free operating system and is backed by a huge open source community.

5.17. Ubuntu desktop

There are many similarities between Ubuntu and other operating systems, such as Microsoft Windows, Apple. This is because they are all based on the concept of a Graphical User Interface (GUI).

The following are the names of the icons in the Ubuntu OS.

- Search your Computer

- Files

- Firefox Webbrowser
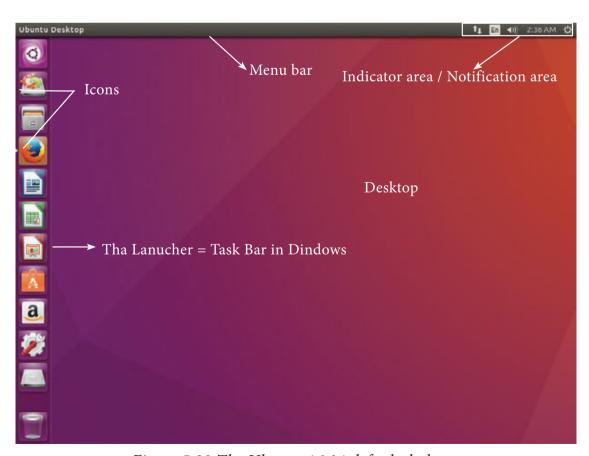
Figure 5.38. The Ubuntu 16.04 default desktop.

- LibreOffice Writer

- LibreOfficeCalc

- LibreOffice Impress

- Ubuntu Software

- Amazon

- System Settings

- Trash

Figure 5.40 explains the icons in the Ubuntu operating system and their equivalent ones in the Windows operating system.

Menu bar The menu bar is located at the top of the screen. The menu bar incorporates common functions used in Ubuntu. The frequently used icons in the menu bar are found on the right. The most common indicators in the Menu bar are located in the indicator or notification area (Figure 5.39)

Figure 5.39 Indicators in the Menu bar

Network indicator - This manages network connections, allowing you to connect to a wired or wireless network.

Text entry settings - This shows the current keyboard layout (such as En, Fr,Ku, and so on) . If more than one keyboard layout is shown, it allows you to select a keyboard layout out of those choices. The keyboard indicator menu contains the following menu items: Character Map, Keyboard Layout Chart, and Text Entry Settings.

Messaging indicator- This incorporates your social applications. From here, you can access instant messenger and email clients.

Sound indicator - This provides an easy way to adjust the volume as well as access your music player.

Clock - This displays the current time and provides a link to your calendar and time and date settings.

Session indicator - This is a link to the system settings, Ubuntu Help, and session options (like locking your computer, user/guest session, logging out of a session, restarting the computer, or shutting down completely).

Title bar - The title bar shows the name of the currently selected directory. It also contains the Close, Minimize, and Maximize buttons.

Toolbar - The toolbar displays your directory browsing history (using two arrow buttons), your location in the file system, a search button, and options for your current directory view.

5.18.The desktop background

Below the menu bar at the top of the screen is an image covering the entire desktop. This is the default desktop background, or wallpaper, belonging to the default **Ubuntu 16.04** theme known as Ambiance. (Figure 5.38)
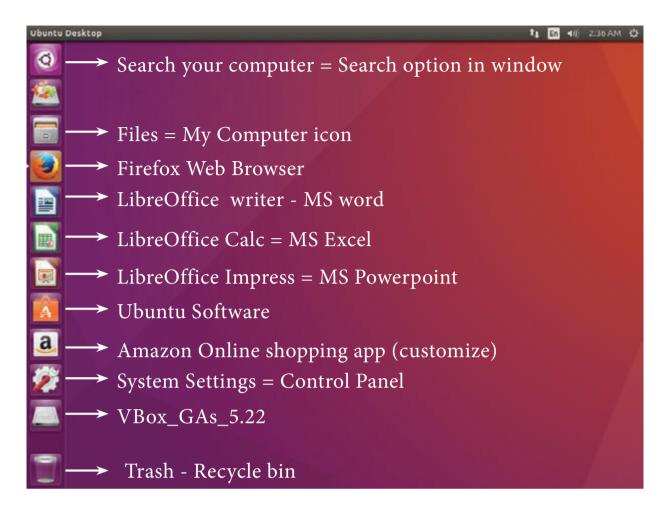
Figure 5.40 Ubuntu Desktop elements

5.19. The Launcher (Equivalent to Task bar)

The vertical bar of icons on the left side of the desktop is called the Launcher. The Launcher provides easy access to applications, mounted devices, and the Trash. All current applications on your system will place an icon in the Launcher. (Figure 5.40)

5.20. Elements of Ubuntu

5.20.1. Search your Computer Icon

This icon is equal to search button in Windows OS. Here, you have to give the name of the File or Folder for searching them. (Figure 5.40)

5.20.2. Files

This icon is equivalent to My Computer icon. From here, you can directly go to Desktop, Documents and so on. (Figure 5.40)

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5.20.3.Firefox Web Browser

By clicking this icon, you can directly browse the internet. This is equivalent to clicking the Web Browser in Task bar in Windows. (Figure 5.40)

5.20.4.LibreOffice Writer

This icon will directly take you to document preparation application like MS Word in Windows. (Figure 5.41)

5.20.5.Libre Office Calc

This icon will open LibreOffice Calc application. It is similar to MS Excel in Windows. (Figure 5.42)
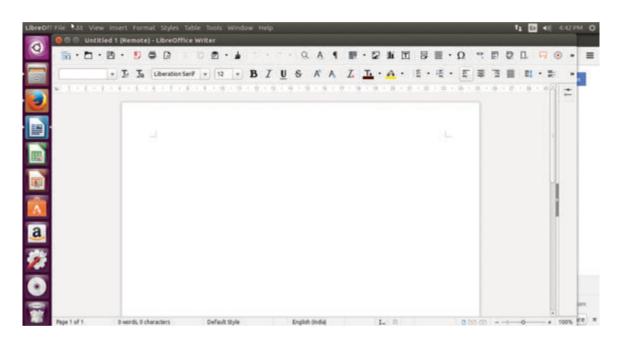
Figure 5.41 LibreOffice Writer Window
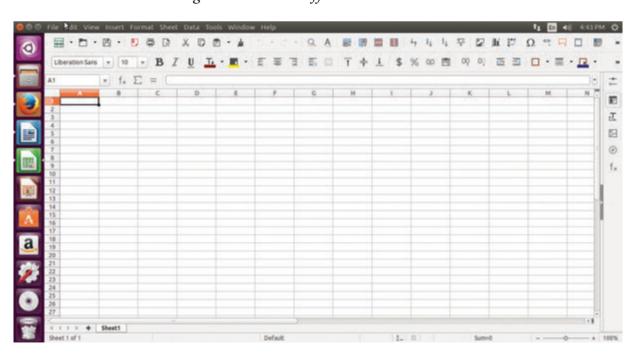
Figure 5.42 LibreOffice Calc Window

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5.20.6 LibreOffice Impress

By clicking this icon, you can open LibreOffice Impress to prepare any presentations in Ubuntu like MS PowerPoint. (Figure5.43)

5.20.7.Ubuntu Software Icon

This icon will let you add any additional applications you want. This can be done by clicking the Update option at the top right corner of that screen. (Figure 5.40)

5.20.8. Online Shopping icon

Using this icon user can buy and sell any products online. (Figure 5.40)
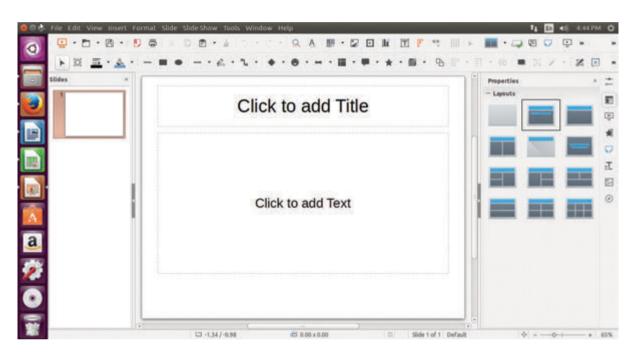
Figure 5.43 LibreOffice Impress Window

5.20.9. System Settings Icons
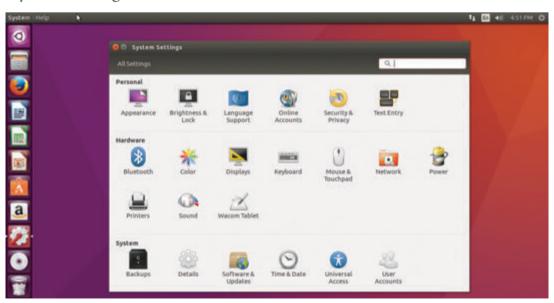
Figure 5.44 System Settings Icons

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This icon is similar to the Control panel in the Windows Operating System. But here, you need to authenticate the changes by giving your password. You cannot simply change as you do in Windows. (Figure 5.44)

5.20.10 Trash

This icon is the equivalent of Recycle bin of windows OS. All the deleted Files and Folders are moved here. (Figure 5.40)

5.21 Creating, Deleting Files/Folders

Similar to Windows OS, you can create, delete the files and folders with the same procedure by clicking Files icon. Figure 5.46 shows the method of creating File or Folder by right clicking in the Desktop. A new File or new Folder can also be created by using File menu (Figure 5.47)
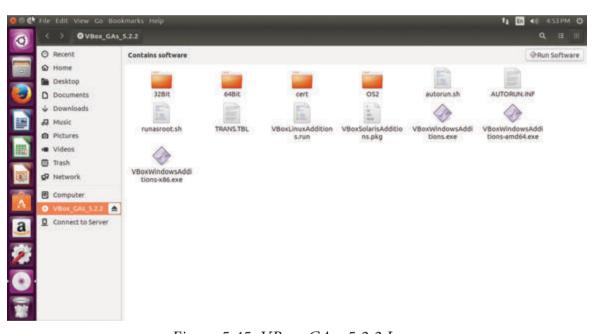
Figure 5.45 VBox_GAs_5.2.2 Icons

Figure 5.46 Creating a File or Folder by right clicking

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Figure 5.47 Creating a File or Folder by using File Menu

Deleting a File/Folder

A file / folder created by you can be moved to trash by using right click or by using menu. (Figure 5.48 & Figure 5.49)
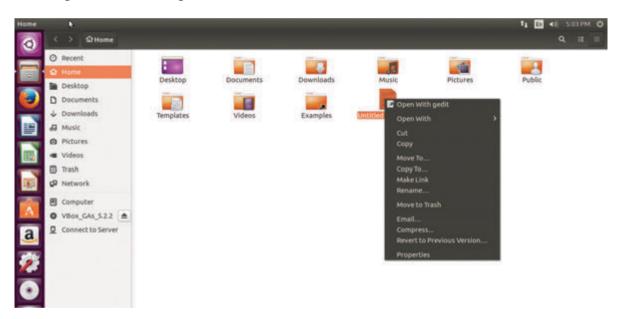

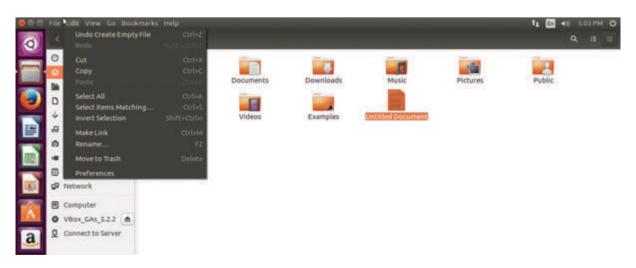*Figure 5.48 Deleting a File or Folder by right clicking*

Figure 5.49 Deleting a File or Folder by using Edit menu

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5.22 Shutting down Ubuntu using Session options

When you have finished working on your computer, you can choose to Log Out, Suspend or Shut down through the Session Indicator on the far right side of the top panel.
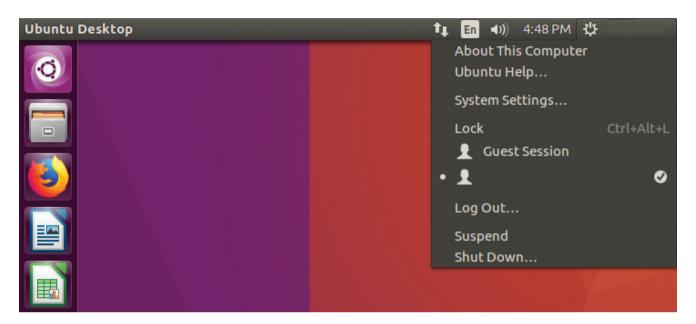
Figure 5.50 Session Options

Activity

Student Activity

1. Create files and folders using Windows and Ubuntu and compare them.

2. Prepare an Assignment on the topic "Popular Linux distributions".

3. Customise few applications using Ubuntu. Write the procedure.

4. Create a File/Folder in Windows 7, Windows 8 and Windows 10. Prepare a report on the differences you face while creating the same.

5. Prepare a table on the difference in views of Windows 7, Windows 8 and Windows 10 operating system.

Teacher Activity

The teacher can adopt the following methodologies to incorporate inside the classroom.

1. Laboratory method – the teacher can take the entire class to the computer lab and demonstrate the concept using projector.

2. Demonstration using laptop and projector – The teacher can demonstrate the same inside the classroom using a laptop and projector.

Evaluation

PART I

Choose the Best Answer

1. From the options given below, choose the operations managed by the operating system.

   a. Memory

   b. Processes

   c. Disks and I/O devices

   d. all of the above

2. Which is the default folder for many Windows Applications to save your file?

   a. My Document

   b. My Pictures

   c. Documents and Settings

   d. My Computer

3. Under which of the following OS, the option Shift + Delete – permanently deletes a file or folder?

   a. Windows 7

   b.Windows 8

   c.Windows10

   d. None of the OS

4. What is the meaning of "Hibernate" in Windows XP/Windows 7?

a. Restart the Computer in safe mode

b. Restart the Computer in hibernate mode

c. Shutdown the Computer terminating all the running applications

d. Shutdown the Computer without closing the running applications

5. Which of the following OS is not based on Linux?

a. Ubuntu   b. Redhat   c.CentOs   d.BSD

6. Which of the following in Ubuntu OS is used to view the options for the devices installed?

a. Settings   b. Files   c. Dash   d. VBox_GAs_5.2.2

7. Identify the default email client in Ubuntu.

a. Thunderbird   b. Firefox   c.Internet Explorer   d. Chrome

8. Which is the default application for spreadsheets in Ubuntu? This is available in the software launcher.

a. LibreOffice Writer   b. LibreOffice Calc

c. LibreOffice Impress   d. LibreOffice Spreadsheet

9. Which is the default browser for Ubuntu?

a. Firefox   b. Internet Explorer

c. Chrome   d. Thunderbird

10. Where will you select the option to log out, suspend, restart, or shut down from the desktop of Ubuntu OS?

a. Session Indicator b. Launcher   c. Files   d. Search

PART II

1. Differentiate cut and copy options.

2. What is the use of a file extension?

3. Differentiate Files and Folders.

4. Differentiate Save and save As option.

5. What is Open Source?

6. What are the advantages of open source?

7. Mention the different server distributions in Linux OS.

8. How will you log off from Ubuntu OS?

PART III

1. Analyse: Why the drives are segregated?

2. If you are working on multiple files at a time, sometimes the system may hang. What is the reason behind it. How can you reduce it?

3. Are drives such as hard drive and floppy drives represented with drive letters? If so why, if not why?

4. Write the specific use of Cortana.

5. List out the major differences between Windows and Ubuntu OS.

6. Are there any difficulties you face while using Ubuntu? If so, mention it with reasons.

7. Differentiate Thunderbird and Firefox in Ubuntu OS.

8. Differentiate Save, Save As and Save a Copy in Ubuntu OS.

PART IV

1. Explain the versions of Windows Operating System.

2. Draw and compare the icon equivalence in Windows and Ubuntu.

3. Complete the following matrix

Navigational method	Located on	Ideally suited for
Start button	Task bar	
	Desktop	Exploring your disk drives and using system tools
Windows Explorer		Seeing hierarchy of all computer contents and resources in one window.
Quick Launch		

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4. Observe the figure and mark all the window elements. Identify the version of the Windows OS.

5. Write the procedure to create, rename, delete and save a file in Ubuntu OS. Compare it with Windows OS.

Operating System (OS)	System software that enables the harware to communicate and operate with other software.
Mouse	Handheld hardware input device that control a cursor in a GUI and can move and slect text, icons, files, and folders.
Windows	Familer operating system developed by Microsoft corpn.
Desktop	Opening screen of windows operating system.
Icon	Tiny image represent a command.
Folder	Container of files
Linux	An operating system.
Ubuntu	A flavour of Linux operating System.
Firefox	One of the familiar web browser.
LibreOffice	Office automation tool available with Ubuntu by default.
Trash	A special folder contains deleted files.

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Part - I Introduction to Word Processor

6.1 An introduction to Word Processor

Word processor is a computer software to create, edit, manipulate, transmit, store and retrieve a text document. The above said activities are called as "Word Processing". In other words, Word processing is an activity carried out by a computer with suitable software to create, edit, manipulate, transmit, store and retrieve text documents.

There are lots of word processing software available as proprietary source as well as open source. The familiar word processing packages are given in the following Table 6.1 given below.

Table 6.1 – Word Processing softwares

Proprietary source Word processing software		Open Source Word processing software	
Package	Developer	Package	Developer
Microsoft Word	Microsoft Corporation	OpenOffice Writer	Apache
WPS Word	Kingsoft	Libre Office Writer	The document foundation
WordPro	Lotus Corporation	Abiword	Abisource

Tamil Word Processors

Tamil OpenOffice writer, Tamil LibreOffice Writer, Kamban 3.0, Mentamizh2017 – these are familiar word processors exclusively for Tamil Language. Microsoft also provides full Tamil interface to its office suite.

In this chapter, you are going to learn about OpenOffice Writer word processor.

6.2 An Introduction to OpenOffice Writer

OpenOffice is the leading open-source office software suite for word processing, spreadsheets, presentations, graphics, databases and more. It is available in many languages and works on all common computers. It stores all your data in an International open standard format and can also read and write files from other common office software packages. OpenOffice is easy to learn.

OpenOffice is a productive office suite with a collection of different software packages such as

- OpenOffice Writer - Word Processor to create text documents
- OpenOfficeCalc - Spreadsheet to create worksheets
- OpenOffice Base - Database
- OpenOffice Impress - Presentation software

- OpenOffice Draw-Drawing Software

- OpenOfficeFormula -Create formula and equations

OpenOffice Writer is the word processor component of OpenOffice. In addition to the usual features of a word processor (spelling check, thesaurus, hyphenation, autocorrect, find and replace, automatic generation of tables of contents and indexes, mail merge and others), Writer provides these important features:

- Templates and styles.

- Page layout methods, including frames, columns, and tables.

- Embedding or linking of graphics, spreadsheets, and other objects.

- Built-in drawing tools.

- Master documents—to group a collection of documents into a single document.

- Database integration, including a bibliography database.

- Database integration.

- Track changes to document.

- Export to PDF easily.

6.2.1 Download and Install OpenOffice

Download and Install the latest version of OpenOffice suite from http://www.openoffice.org/downloadat free of cost.

6.2.2 Creating a new document in OpenOffice Writer

A new OpenOffice Writer document can be created by various methods. From windows, select

Start → All Programs → OpenOffice → OpenOfficeWriter

(or)

From Star Center (Welcome Screen):

- Double-click on **"OpenOffice"** icon on the desktop

- Now, a welcome screen appears as shown in Figure 6.1

Figure 6.1 Opening Screen (Star Center) of OpenOffice

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This opening screen is called as "Star Center". Writer is one of the components of OpenOffice. So, it may be invoked from the "Star Center" by simply clicking on the "Text Document" icon. (or) A new text document can also be created by selecting File → New →Text Document (or)Ctrl + N keyboard short cut can also be used to open a new text document as shown in the Figure 6.2

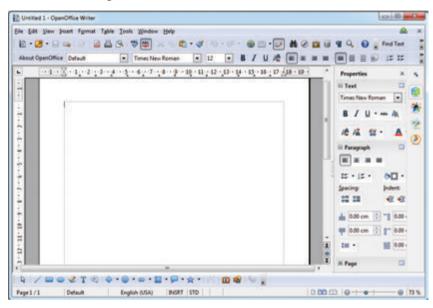*Figure 6.2 OpenOffice Writer Window*

6.2.3 Parts of Writer Window:

The Figure 6.3 shows the contents of OpenOffice Writer window such as Title bar, Menu bar, Standard Toolbar, Formatting Tool bar, Ruler, Work space and Status bar. The components of a OpenOffice writer window in Figure 6.3 are explained below :
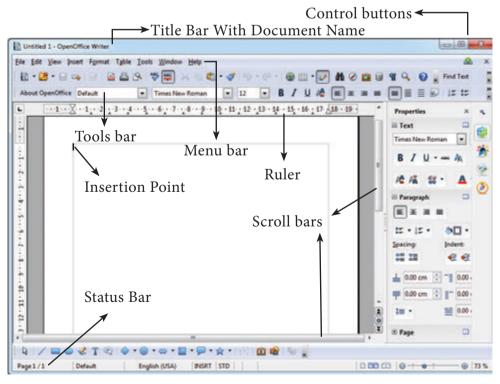

Figure 6.3 Components of Writer Window

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Title Bar

The title bar is displayed at the top most part of the window, which displays the name of the document and the name of the application. By default, the initial document is given the name as Untitled1.

Control Buttons:

In the right corner of title bar is the (1) minimize, (2) maximize/restore and (3) close controls buttons are available.

(1)   Minimize button:

When you click minimize button, it shrinks your document window smaller in size and shows it as a button on the taskbar(Refer figure 6.5). To restore it in its original size, place your mouse pointer on the OpenOffice button which is available in the taskbar, you can view your document as miniature and when you click on the button, your document is restored to its original size.

(2)   Maximize button :

When you click maximize button, your document window is displayed in full screen. When it is in full screen, the maximize button is changed as "Restore". When you click restore button, the document window regains its original size.
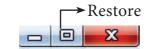

Figure 6.4 – Sizing buttons

(3)   Close button :

When you click close button, the current application is closed and OpenOffice returns back to the desktop. So, the red colored close button as shown in Figure 6.6 may be called as "Exit" or "Quit".There is another X mark on the right most corner of the menu bar. This is actually used to close your document. When you click this X mark, your document will be closed, OpenOffice will be still opened.
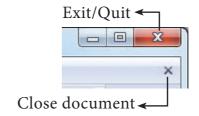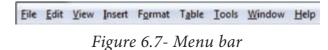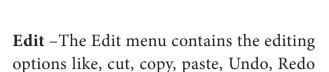

Figure 6.6 Close and close document button

Menu Bar

The menu bar is just below the title bar which comprises of various menus and each menu consists of various options(Refer figure 6.7):

Figure 6.7- Menu bar

File –The File menu contains various options for file management tasks : New, Open , Close, Save, Save As, Print , Export etc.

Figure 6.5 Miniature button of OpenOffice document

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Edit –The Edit menu contains the editing options like, cut, copy, paste, Undo, Redo etc.

View –The View menu contains the options which are used to modify the environment of Writer like display of toolbars, web layout, print layout, navigator etc.

Insert – The Insert menu contains options for inserting various elements such as pictures, tables, charts, comments, headers, footers, special characters etc.

Format – The Format menu contains options of various text and page formatting features like page size, layout, font characteristics, bullets and numbering etc.

Table – The Table menu contains various tools to manage and manipulate tables such as create table, insert rows, insert columns, split cells, merge cells etc.

Tools – The Tools menu contains various tools and functions such as spell check,

macros, mail merge, end notes/footnotes etc.

Window – The window menu shows display options such as New Window, Close Windows, Split and Freeze.

Help – The Help menu lists out the inbuilt help features available with OpenOffice.

Toolbar:

Under the menu bar, there are two toolbars available by default. They are:

(1) Standard Toolbar

(2) Formatting Toolbar

Standard Toolbar– This tool bar is just below the menu bar which consists of shortcut icons for frequently performed tasks. There are many shortcut icons like cut, copy, paste, undo etc…(Refer figure 6.8)

Figure 6.8 –Standard Tool bar

Formatting Toolbar– The formatting tool bar is below the standard toolbar which consists of icons used for formatting the text like bold, underline, italics, font type, font color etc. (Refer figure 6.9)

Figure 6.9- Formatting toolbar

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Ruler

The ruler is a scale below the formatting tool bar which shows the margins.There are two set of rulers (1) Horizontal ruler and (2) Vertical ruler. Horizontal ruler is used to set left and right margins of a page and vertical ruler for top and bottom setting.

Figure 6.10 - Ruler

Work Space

The work space is the blank area which is used to type the content of the file.A flashing vertical bar appears at the beginning of the screen which is called as "Insertion pointer".

Status Bar

The status bar is at the bottom of the window which shows the current status of the document such as number of pages, current page number, default language etc.

6.2.4 Entering the Text

Once a new document is open, the text can be typed in blank area of the screen. To create a document the user can start typing straight away. As the text is typed they appear on the screen and the flashing vertical bar called the insertion pointer moves to the right. When the text reaches the end of the line, the word is automatically wrapped to the next line. This feature in any word processor is known as "Word Wrap".

The **Enter** key must not be pressed at the end of the each line. The Enter key should be pressed only at the end of a paragraph or when a blank line is to be inserted. When a page is filled up,OpenOffice Writer automatically creates a new page.

6.2.5 Moving around the document

There are different ways of moving around a document. There are many shortcut keys given in Table 6.2which are used to move easily within a document.

Table 6.2 – Short cut keys

KEY	ACTION
→	To move a character right
←	To move a character left
↑	To move one line up
↓	To move one line down
Ctrl + →	One word right
Ctrl + ←	One word left
Ctrl + ↑	One paragraph up
Ctrl + ↓	One paragraph down
Home	To the beginning of line
End	To the end of line
Ctrl + Home	To the beginning of document
Ctrl + End	To the end of document
Tab	To move one cell to right
Shift + Tab	To move one cell to left
Pg up (Page Up)	To scroll one screen up
Pg Down (Page Down)	To scroll one screen down

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6.2.6 Saving the Document

The first time the document is saved, OpenOffice Writer prompts for a name. Naming the file enables the user to find and open that file again. One can select the drive and folder where the file will be stored. To save a document for a first time,the following steps are used:

- Click File → Save (or) File → Save As (or) Ctrl + S

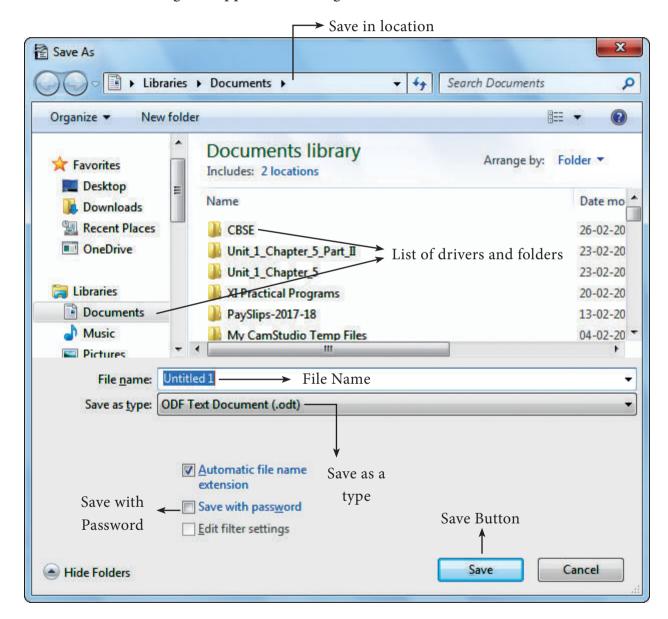- "Save As" dialog box appears as on Figure 6.11.

Figure 6.11-Save As dialog box

- Select location to store your document. The default location to store all documents is "Documents" folder in Windows.

- Type your document name in the File Name text box.

- All documents in OpenOffice will be stored with .odt extension. You can store your OpenOffice document as Microsoft Word document or pdf. To do so, select file type from Save as list box and select the required file type.

- Finally, Click **"Save"** button.

- Once the file is saved, your document name will be displayed on the title bar.

Saving with password

In OpenOffice writer, a document can be protected with a password. You can set a password to protect your document while saving a file. To save a file with password, click on "Save with Password" check box and then click "Save" button. Immediately it shows "Set Password" dialog box as given the Figure 6.12.

Figure 6.12 – Password dialog box

In this dialog box, Enter a password in "Enter Password to open" text box and retype the same password in "Confirm Password" box for confirmation. Finally click **"OK"** button.

6.2.7 Closing a Document

After your document is saved, it is still open. So, you can continue typing your document. When the work is finished, you should save the document and close the document using File → Close command (or) Press Ctrl + W.

Closing Unsaved Document:

When you close an unsaved file using the close control button, Writer shows a warning message (Refer Figure 6.13).
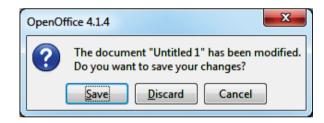

Figure 6.13 Alert Message box

If you accept the warning message, click the "Save" button. When you click the "Save" button, it proceeds to save the file. If you are not willing to save the file, then click "Discard", or if you want to cancel this warning and continue working in the same document, click "Cancel".

6.2.8 Opening an existing document

Once a document is saved, it can be opened at any time. To open an existing

document, Click on the **File → Open** or

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Ctrl + O, the Open dialog box appears, enter the name of the file in the File name text box and click on OPEN button as in Figure 6.14.
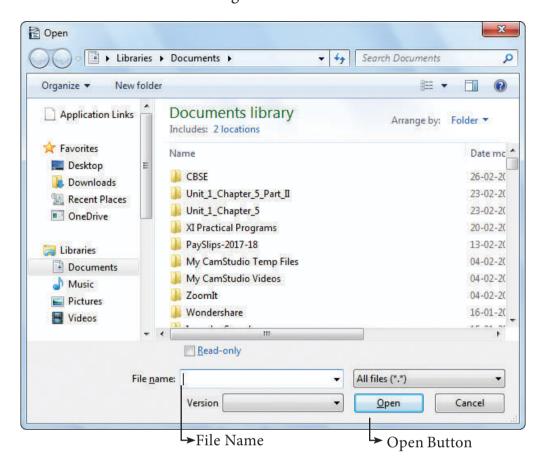

File Name   Open Button

Figure 6.14 – Open dialog box

6.3 Tamil Typing Interface

Typing in Tamil has different methods.

- Using Tamil Font

- Using Tamil Interface.

In the first method specificTamil fonts are available which has to be downloaded and installed and should be included in the font folder of the control panel. But this method has some drawbacks:

- The user must be aware of Tamil typing.

- The particular font must be available in the system.

- It does not support other languages including English.

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- The computer acceptscharacters as symbols not as language.

- It is not portable, i.e. if the document is sent to another computer, if the same font is not available, it is recognized as symbols not as original characters.

To overcome the drawbacks in the first method, the interface method provides the following advantages:

- It follows Unicode technique. Hence knowledge of Tamil typing is not necessary.

- It is easy to type documents in Tamil in any word processor.

- Some of the Unicode fonts like "Arial Unicode" supports all Indian languages including Tamil and English using respective language interface.

6.3.1 Download and Install Tamil Typing Interface

Many Tamil Typing Interfaces are available as open source such as "Murasu"(it is exclusively for Tamil), "NHM Writer"(It is universal to all Indian languages) etc.

To download and install:

- "Murasu" use the link : http://anjal.net/download

- "NHM writer" use the link : http://software.nhm.in

6.3.2 Connecting with Writer

Once the Tamil Interface is downloaded and installed in your computer, each time you start, the interface automatically gets activated and this is indicated by a unique symbol in the notification area. By default the shortcut keys are set as Alt+1 for English and Alt+2 for Tamil and it can be changed. For different languages shortcut keys can be assigned.

6.3.3 Entering Text in Tamil

Step 1 : Open a new document in Writer.

Step 2 : Press Alt+2 to type in Tamil, Alt + 1 to type in English.

The keyboard structure for Tamil interface is given in Annexure-2:

Different styles of Unicode Tamil fonts can be downloaded from this link:http://www.tamilvu.org/tkbd/indexen.html
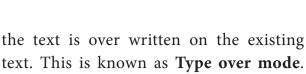
6.4. Editing a document

Once a document is typed, it can be edited in many ways. If there is some insertions or deletions, it can be done while typing or after typing also. Corrections can be made in two different ways :

Backspace Key: Deletes the character left of the insertion pointer

Delete Key : Deletes the character right of the insertion pointer

To insert new text in between, if something is left out, insertion can be made by taking the insertion pointer to the current location and Press the **Insert Key**, the newly typed text is inserted, and the existing text moves to the right.This is **Insert mode.** Press the **Insert Key** again,

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the text is over written on the existing text. This is known as **Type over mode**. You can toggle between the insert mode and type over mode by pressing the **Insert Key.**

6.5 Select, Move and Copy text

6.5.1 Selecting Text

In any word processor, the text has to be selected for performing any operation like copying,　moving, formatting etc. This text selection can be done by two methods:

i) Selecting the continuous text.

ii) Selecting the Non-continuous text.

Selecting the Continuous text – To select the text continuously take the insertion pointer to the starting of the text,

- Hold the **SHIFT** key and drag the mouse across until the required text is selected and then release the **SHIFT** key.

- The selected text can be used for any operation.

  Selecting theNon-continuous text- To select the text not continuously, take the insertion pointer to the starting of the text,

- Hold the **CTRL** key and drag across it till the required text is selected and release the **CTRL** key.

- The selected text can be used for any operation.

Selection by Different methods:

Selection using Mouse :

To select the text using mouse:

(i) Take the insertion pointer to the start of the text

(ii) Hold down the Left mouse button and drag it across the text

(iii) Release the mouse button when the required portion of text is selected

(iv) The selected text will be highlighted.

Selection using Keyboard :

To select the text using keyboard :

(i) Take the insertion pointer to the start of the text

(ii) **Hold** the **SHIFT** key and use the movement keys to drag across the required portion.

(iii) When the required portion is selected release the **SHIFT** key

(iv) The selected text will be highlighted.

Selection using Short Cut Keys:

Short cut keys help to select the text quickly and easily

- To select a word - Double click on the word

- To select the entire document – Press **Ctrl + A**

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6.5.2 Moving and Coping text

Moving text

To move a text from one location to another

- select the text to be moved
- Click **Ctrl + X** or Cut Icon ✂ or **Edit → Cut**
- The text is removed from the source location and placed in the clipboard
- Take the insertion pointer to the new location to be moved and
- Click **Ctrl + V** or Paste Icon 📋 or **Edit → Paste**

The required text is moved to the required location.

Coping text

To copy a text from one location to another

- select the text to be copied
- Click **Ctrl + C** or Copy Icon 📄 or **Edit → Copy**
- A duplicate copy of the text is made and send to the clipboard
- Take the insertion pointer to the new location to be copied and
- Click **Ctrl + V** or Paste Icon 📋 or **Edit →Paste**

The required text is copied to the required location.

The Editing shortcut keys are as given in Table 6.3.

Table 6.3 Cut, Copy , Paste Icons and shortcut keys

OPERATION	ACTION	ICONS	SHORTCUT KEY
CUT	Cuts the selected text	✂	Ctrl +X
COPY	To make a duplication of the text.	📄	Ctrl +C
PASTE	To paste the text to a new location after cut or copy process.	📋	Ctrl +V
UNDO	Cancels the previous operation that was performed	↩	Ctrl +Z

6.6 Help System in Writer

OpenOffice Writer provides several forms of help. By pressing F1 or select Help from the menu bar the help window appears as shown in Figure 6.15:

Figure 6.15 Help window

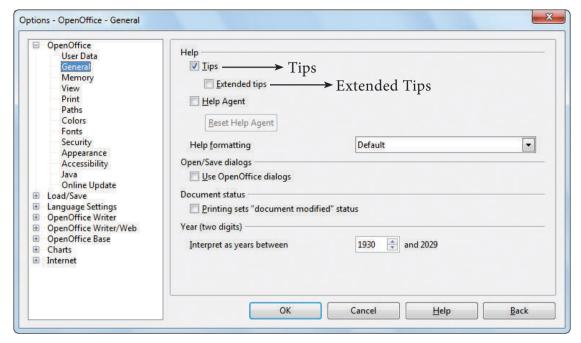- To activate tooltips, extended tips, and the help Agent, click Tools → Options → OpenOffice

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Figure 6.16 – General settings window

- For a more detailed explanation, select Help → What's This? and hold the mouse pointer over the icon where you want more help with.

Workshop

6 -1 Open a new document in Open office writer.

- Type the following paragraph.

- "The ignited minds of the youth is the most powerful resource on the earth. The power of the youth, if properly directed, will bring about transformed humanity by meeting its challenges and bring peace and prosperity."

- Save and close the document.

- Exit from Open office writer.

6.2 Open the document created in Workshop 6.1.

- Append the following paragraph.

- "We are as young as our faith and as old as our doubts. We are also as young as our self-confidence and as old as our fears. We are as young as our hopes and as old as our despairs."

- Save the document

- Using Delete or Backspace key remove the last line of the first paragraph.

- Type the following lines after the second paragraph and create it as a new paragraph.

- "It doesn't matter who you are, if you have a and determination to achieve that vision, you will certainly do so."

- In the third paragraph insert the word "vision" between "a" and "and ".

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6.3 Open the document created in workshop-6.1.

2. Copy and paste the following words into a new document either using keyboard or mouse shortcuts. Ignited (ii) powerful (iii) humanity (iv) challenges (v) prosperity

3. Save the new document

4. In the first document, move the following words either using keyboard mouse shortcuts.

(i) Ignited (ii) Challenges (iii) Prosperity

Part - II Formatting text and Paragraph

6.7 Text formatting

A text without any special formatting gives a monotonous appearance. OpenOffice Writer offers a number of choices for formatting such as bold or italics, defining the font, type, and font size. Bold, italic or underlined are the most common types of text formatting.Almost all the formatting options are available under Format menu.

6.7.1 Changing font style, size and colour

A font is a set of characters in a particular style. Changing the default appearance of the text like changing the font type , size, color, style etc., are called as Text formatting. To make the text attractive and more appealing, various formatting's like bold, italic and underline can be done by using the following commands given in Table 6.4.

Table 6.4 Text formatting shortcuts

OPERATION	ACTION	ICON	SHORTCUT KEY
BOLD	Makes the text bold	B	Ctrl+B
ITALICS	Italicizes the text	I	Ctrl +I
UNDERLINE	Underlines the text	U	Ctrl +U

The default font type is Times New Roman and the type of font can be changed by clicking on the Font Type icon. Trebuchet MS ▼

The default size of font is12 points which can be changed by clicking on the FontSize icon . 14 ▼

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The default font color is black and the font color can be changed by clicking on the Font color icon $\boxed{\text{A} \; \blacktriangledown}$ which shows the color palette from which the required color can be selected.

Besides the regular formatting like Bold, Italics and underline, other formatting options can be done by using **Format → Character**. The Character dialog box is displayed as shown in the Figure 6.17 appears, using which all the formatting can be done easily.
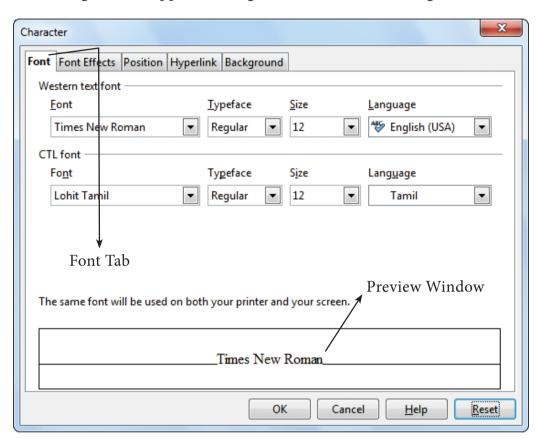

Figure 6.17 – Character dialog box

6.7.2 Changing Case

Normally any text can be typed in upper or lower case. The text can be changed to different cases like

- Uppercase(Capital letters),
- toggle case(reverse case),
- sentence case(first letter of each sentence capital),
- Capitalize every word(first letter of each word capital),
- lower case (small letters).

This can be done by :

- Select the text to change case
- Select **Format → Change** case.

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6.7.3 Highlighting text

Highlighting is used to draw attention to important information in a text. Highlighting is beneficial because it first asks the reader to pick out the important parts, and then gives an effective way to review that information later.

Highlighting can be applied by selecting the text and click Highlighting icon ,the color palette is displayed, select the required color, and the text is highlighted. Highlighting can be removed by selecting the text and click **No Fill** from the color palette.

Note

Highlighting is to draw attention to important or key points in a document for easy reference by marking it with a different color.

6.7.4 Clearing the formatting

Normally text is monotonous without any formatting, so we can format in different ways, after the formatting is applied, it can be removed by

• Select the entire document by Ctrl + A or Edit →Select All,

• clear the formatting by Ctrl + M.

6.8 Paragraph formatting

A paragraph is any text that ends with a hard return. A hard return is accomplished any time you press the Enter key. Paragraph Alignment or justification refers to the way in which the lines of a paragraph are aligned. Paragraph alignment lets you control the appearance of individual paragraphs.There are four types of alignment available in OpenOffice
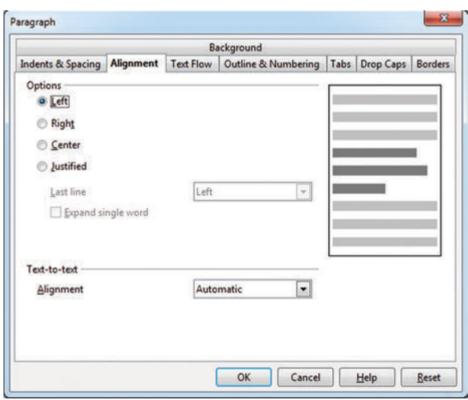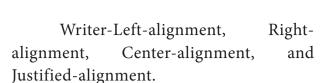

Figure 6.18 – Paragraph dialog box

Writer-Left-alignment, Right-alignment, Center-alignment, and Justified-alignment.

Left-alignment - A paragraph's text is LEFT aligned when it is aligned evenly along the left margin and uneven along the right margin. This is the default alignment when a paragraph is typed.

Right-alignment - A paragraph's text is RIGHT aligned when it is aligned evenly along the right margin and uneven along the left margin.

Center-alignment- All the lines in the paragraph are aligned to the center of the page size.

Justified-alignment - All the lines in the paragraph, are arranged evenly both on the left and right margins. This is achieved in writer by automatically inserting additional space between the words.

Paragraph formatting can be applied by Format →Paragraph, the paragraph dialog box appears as displayed in Figure 6.18.

The paragraph formatting can also be done by icons using the formatting tool bar as shown in Figure 6.19 and shortcut keys as shown in Table 6.5.
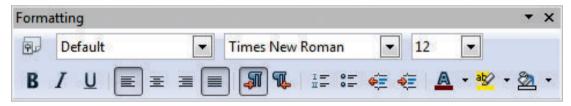
Figure 6.19 – Formatting toolbar

Table 6.5 Paragraph Alignment Icons and Shortcut keys

ALIGNMENT	ACTION	ICON	SHORT CUT KEY
LEFT	Aligns the paragraph with respect to the left margin		Ctrl + L
RIGHT	Aligns the paragraph with respect to the right margin		Ctrl + R
CENTER	Aligns the paragraph with respect to the center of the page		Ctrl + E
JUSTIFIED	Aligns the paragraph with respect to both the left and right margin		Ctrl + J

An example showing all the four paragraph alignment :

Left Alignment

All power is with in you take up one idea, make that one idea your life. Think of it dream of it, live on that idea let the brain, muscles, nerves, every part of your body be full of that idea, and just leave avry other idea alone. This is the way to success.

Right Alignment

All power is with in you take up one idea, make that one idea your life. Think of it dream of it, live on that idea let the brain, muscles, nerves, every part of your body be full of that idea, and just leave avry other idea alone. This is the way to success.

Center Alignment

All power is with in you take up one idea, make that one idea your life. Think of it dream of it, live on that idea let the brain, muscles, nerves, every part of your body be full of that idea, and just leave avry other idea alone. This is the way to success.

Justified Alignment

All power is with in you take up one idea, make that one idea your life. Think of it dream of it, live on that idea let the brain, muscles, nerves, every part of your body be full of that idea, and just leave avry other idea alone. This is the way to success.

Example 6.1 Paragraph Alignment

6.8.1 Line Spacing

Line spacing determines the amount of vertical space between lines of text in a paragraph. By default, the lines are single line spaced. The easiest method to change the line spacing is to right-clickon the line and select line spacing from the pop up menu,the pop up menu provides three options single, 1.5lines or double from which the user can select the desired type(Refer figure 6.20).

To Change the line spacing using paragraph dialog box.

- Select the required text

- Select **Format → paragraph**

- The paragraph dialog box appears, click on Indents & Spacing tab

- In the line spacing drop down, select the required line spacing (there are seven different types of line spacing) and
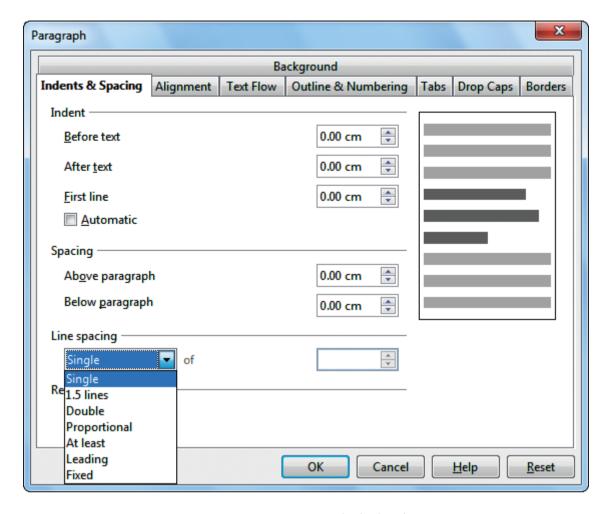
- click OK button.

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Figure 6.20 Paragraph dialog box

6.8.2 Indenting text

Indent is the distance from the left and right margin of a paragraph. It is used to improve the efficiency and readability of the paragraph and makes the paragraph look more attractive. In paragraphs, an easy way to apply indent for the first line of text can be created by moving the insertion pointer to the begining of the line and pressing the tab key on the keyboard.

There are two ways to apply indents:

- Using Icons
- Using Dialog Box

Using Icons :

Increase Indent Icon : The increase indent icon controls the space between the paragraph and the left margin. Each click on the Increase indent icon moves the paragraph ½ inch away from the left margin.

Decrease Indent Icon : This is reverse of increase indent. It undoes the indent applied by increase indent. Each click on the Decrease indent icon moves the paragraph ½ inch away from the right margin.

Using Dialog Box:

  Format → Paragraph displays the paragraph dialog box as shown in Figure 6.20, select the Indent & Spacing tab which has the indent group which has three options.
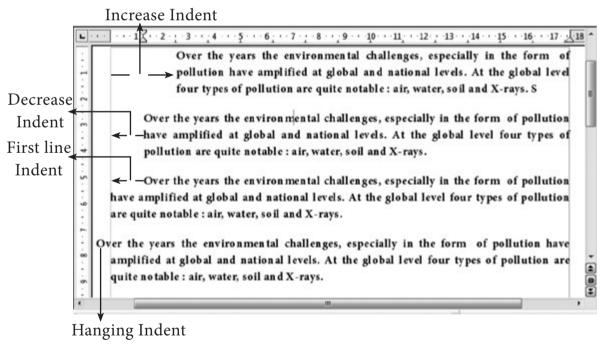
Left Indent : This is the default indent where a paragraph is moved away from the left margin. In the paragraph dialog box, in the "Before Text" spin box, enter a value which moves the paragraph away from the left margin.

Right Indent : This is another type of indent which moves the paragraph away from the right margin. Enter a value in the "After text" spin box of the paragraph dialog box, which results in right indent.

  First Line Indent - A first-line indentation indents the first line of the paragraph. It is the most common way to start a new paragraph. This indent can be applied by **Format → Paragraph → Indents & Paragraph** tab, select first line option in the indent group, enter a positive value which results in first line indent.

Hanging indent – This is a special kind of indent where the first line of the paragraph alone hangs outside leaving the rest of the text. To apply Hanging indent, a negative value is given in the "first line" option of the paragraph dialog box.

Example 6.2 shows different kinds of indents.

Example 6.2 - Different kinds of Indents

6.8.3 Bullets and Numbering

  Bullets and numbering are used to emphasize list of things and make list easy to read and follow. It provides an excellent way to control the appearance in the form of bulleted or numbered list.

Bullets – This icon is used to add a bullet character to the start of each paragraph. This is suitable when the text has to be presented as a list of items preceded by a bullet symbol and no sequence has to be followed. Bullets are quickly created by clicking on the bullet icon ⚏.

Numbering – This icon is used to add a numeral to the start of the each paragraph. Numbering is more suitable when the text has to be presented as a sequence.   In numbered list, each paragraph begins with an expression that includes a number or letter and a separator such as a period or parenthesis.

The numbers in a numbered list are updated automatically when you add or remove paragraphs in the list. Numbering is quickly created by clicking on the numbering icon ⚏.

6.8.4 Style of Bullets and Numbering -

The default type of bullet is (.) and the default type of numbering is (1, 2, 3 ……). The style of bullets and numbering can be changed by applying the following steps:

- Select the text to be bulleted
- **Format → Bullets** and Numbering
- Select **Bullets** Tab
- The Bullets and Numbering dialog box appears with different styles of bullets are displayed
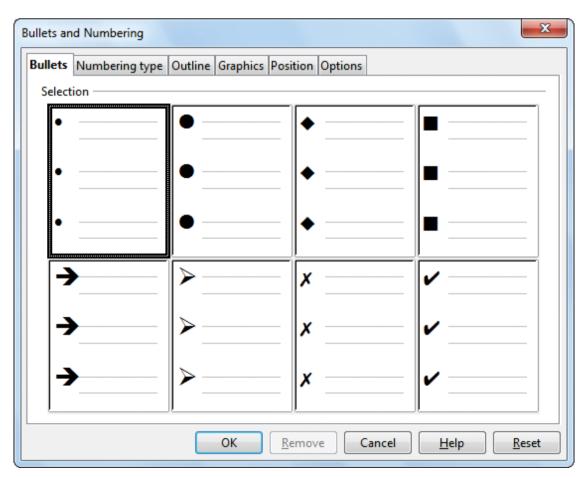

Figure 6.21 Bullets and Numbering dialog box

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- Click on the required style

- Click **Ok** button

The selected text is bulleted.

      The Bullets and Numbering dialog box with the bullets tab is displayed in Figure 6.21.

Note

If the text is not typed, then apply the steps above and then type the text, the newly entered text will appear in bulleted form.

To apply Numbering

1. Select the text to be numbered

2. **Format →Bullets and Numbering**

3. Select **Numbering type** Tab

4. The Bullets and Numbering dialog box appears with different styles of numbering are displayed

5. Click on the required style

6. Click **Ok** button

7. The selected text is numbered.

      The Bullets and Numbering dialog box with the numbering tab is displayed in Figure 6.22.

Note

If the text is not typed, then apply the steps above and then type the text, the newly entered text will appear in numbered form.

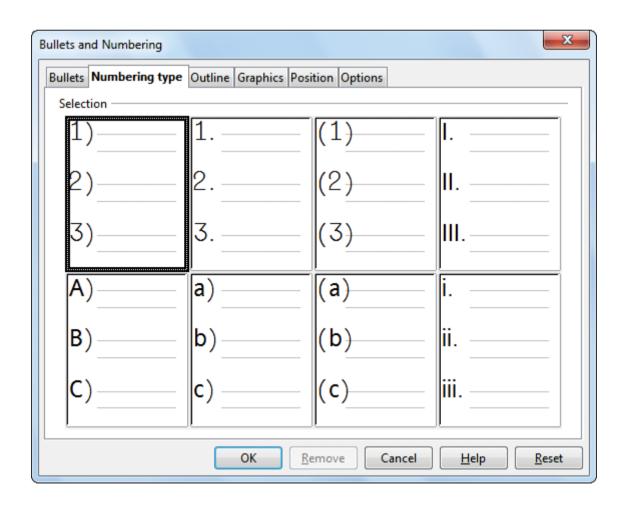*Figure 6.22 Bullets and Numbering dialog box*

Turning off Bullets and Numbering –

As you can quickly add bullets or numbers to existing text by clicking on the icons, the bullets and numbers can be removed easily.

- Select the text where the bullets and numbers are to be removed.
- Click on the bullets icon again to remove bullets.
- Click on the numbering icon again to remove numbering.

6.9 Page formatting

The most important thing in a word processor is how to format the page by changing margins, numbering, page layout, headers and footers. Formatting your pages makes them look more attractive and makes them easier to read.

6.9.1 Setting the page size and margins
Changing page size

The default page size in writer is **8.5 x 11"**, the same as that of a standard A4 printing paper. However, for different types of documents, you may need to change the page size. To change the page size:

- Select the page whose page size is to be changed
- Select **Format → Page**, the page style dialog box appears as shown in Figure 6.23.
- Select Page Tab
- In the **paper format group,** select the format like A4, legal ….
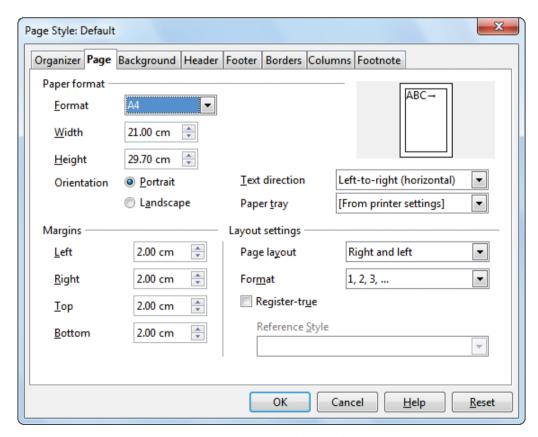- Or the **width** and **height** option can be used to set the page size.

Figure 6.23 Page style dialog box

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Changing page margins

Page margins are the white space around the top, bottom, left, and right of your document. Margins let Writer know where to start placing the text at the top of a document, when to move on to the next page at the bottom, where to start typing text on the left side, and where to stop and move to the next line on the right.

Changing or setting page margins in OpenOffice writer can be done in two ways:

1. Using the **Rulers**—quick and easy, but does not have precise values.

2. Using the **Page Style** dialog box—can specify precise values for the margins.

Changing page margins - using Ruler

1. The shaded sections of the rulers are the margins.
2. Hold the mouse pointer over the line between the gray and white sections.
3. The mouse pointer turns into a double-headed arrow.
4. Hold down the left mouse button and drag the mouse to move the margin and release it at the required point.
5. The new margin is set.

Using Page Style dialog box

To change margins using the Page Style dialog box

1. **Right-click** anywhere on the page and select Page from the popup menu or select page tab of page style dialog box.
2. In the **Margins** boxes, specify the values for left , right , top and bottom margins.
3. Click on ok button.

6.9.2 Orientation

Page orientation refers to how the document will be displayed on screen and printed. There are two different orientations:

Landscape - The width of the document is more than the height. This is best suited for displaying table, professional photos, invitations, album etc.

Portrait – This is the most common and default orientation. Here, the height of the document is more than the width. Normally books, newspapers will be displayed in this format.

To change the orientation:

- Select the page whose orientation is to be changed
- In the **Page style** dialog box, under the **Orientation** group,
- Select **Portrait** or **Landscape** button.

6.9.3 Page colour and borders

Changing the page color is not quite common. To do so, in the **Page style** dialog box , in the **Background** option, click on **color** and select the **"color"** from the color palette or select **"graphic"** to apply an image as a page background, it, as shown in Figure 6.24.

Borders can be applied to an entire document, an entire page, paragraph, or just to certain sections of the document. From the page style dialog box , select the Border tab, the user defined area helps to define the area of borders, the line style of borders, color of borders Figure 6.25 shows the borders setting in the page style dialog box.
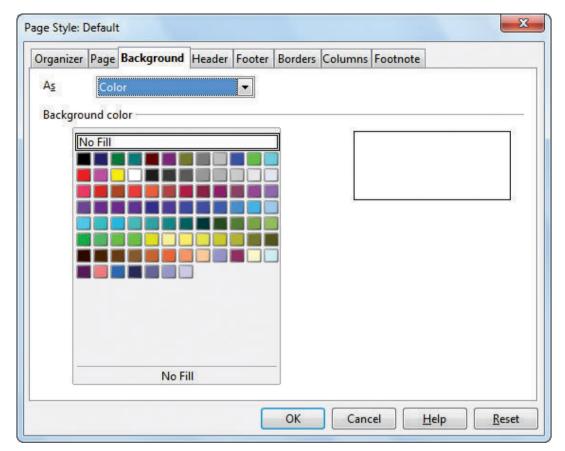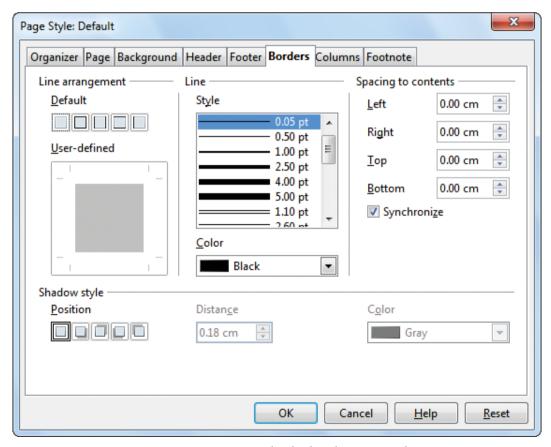
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Figure 6.24 Background color

Figure 6.25 Page style dialog box - Borders

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6.10 Working with Headers and Footers

The **header** is a section of the document that appears in the **top margin**, which displays the title or chapter name, author name of a document .

The **footer** is a section of the document that appears in the **bottom margin** of the page which displays the page number, date, time etc. which gets displayed on all the pages automatically.

6.10.1 Inserting Header and Footer

- Select from the main menu I**nsert → Header → Default**

- The header text area is separated from the normal text area.

- Enter the text that is to be repeated in all pages or Select **Insert → Fields →Title.**

Similarly to insert a Footer, the steps are as given below:

- Select from the main menu **Insert →Footer → Default**

- Place the insertion pointer in the Footer part of the page.

- Select **Insert → Fields → Date** to insert date in all the pages.

Once the headers and footers are given in the first page, the same text will appear in all the pages.

6.10.2 Inserting and Formatting page numbers

Once the Header / footer area is enabled, the page numbers can be inserted by performing the following steps:

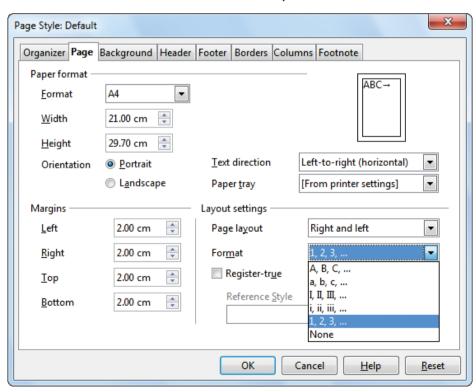- Position the insertion pointer where you want to insert the number.

Figure 6.26 Page style dialog box

- choose **Insert → Fields → Page Number**

- The page number appears with a gray background

Normally, the page numbers appear as 1,2,3….., To change the numbering style, the following sequence of steps can be performed:

- Position the insertion pointer where the page number has to appear

- Select **Format → page**, which will bring the page style dialog box as on Figure 6.26.

- Select page Tab

- In the Layout settings, select the format drop down combo box

- Select the desired style and click **OK** button.

Workshop

6.4 Open a new document in OpenOffice writer.

- Type the following paragraph

"Learning gives creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes you great"

- Save the document

- Perform text formatting features like Bold, Italics, Underline, Change font, change Size, Color and change case (Upper case to lower case, lower to upper) for the words. (in the paragraph and make the paragraph more appealing to read.

- Highlight the text "Knowledge makes you great"

- Undo all formatting options using keyboard shortcut.

6.5 Open the document created in the workshop 6.4

- Type the following lines below the first paragraph

" When one door closes, another opens, but we often look so long and so regretfully upon the closed door that we do not see the one that has opened for us – Alexander Grahambell "

- Using any one of the paragraph alignment icons or keyboard shortcuts (left, right, center, or justified) align the first paragraph.

- Change the line spacing of second paragraph to any one of the type.

- Create bullets for the first paragraph and numbering for the second paragraph using icon or menu choice.

- Save and close this documents.

6.6 Open the document created in workshop-6.5

- Change page size, margin and orientation, change border and background color.

- Apply suitable header and footer for the table.

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6.11 Find and Replace

OpenOffice Writer has a Find and Replace feature that helps to locate for a text inside a document and replace it with another word. In addition to finding and replacing words and phrases, you can also use wildcards and regular expressions to perform advanced search. To search a word

- Click **Edit → Find & Replace** (or) **Ctrl + F**
- The Find & Replace dialog box appears as shown in Figure 6.27.

Steps to find and replace a text

1. Type the text you want to find in the **Search for** box

For Example: To search for a word "Bombay" in a document and replace with "Mumbai", enter the word "Bombay" in the Search for box

2. To replace the word with different text, type the new text in the **Replace with** box

Enter the word "Mumbai" in the Replace with box and

Click **Find** button , to start the search , the found word is highlighted

The first occurrence of "Bombay" is highlighted
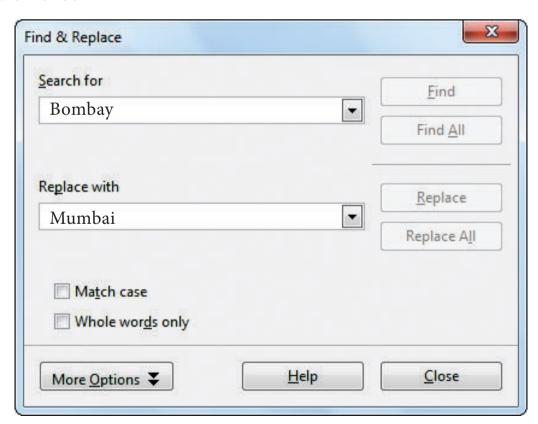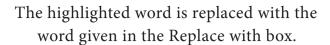
3. To replace text, click **Replace** button.

Figure 6.27 Find and Replace dialog box

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The highlighted word is replaced with the word given in the Replace with box.

4. Click **Find All**, Writer selects all instances of the search text in the document

   All occurrences of "Bombay" are highlighted.

5. Click **Replace All** button, Writer replaces all matches.

   This will replace all occurrences of "Bombay" with "Mumbai"

6. Enable **Match case** to perform the search case sensitively so that uppercase and lower cases are distinguished separately.

7. Enable **Whole Words only** to make the search more specific to words used separately alone.

Workshop

6.7 Open a new document.
- Type the following paragraph
- "All birds find shelter during a rain. But Egles avoid rain by flying above the clouds. Problems are common, but attitude make the difference."
- Apply Find & Replace.
- Find the word "Egles" and replace it with "Eagles".
- Save the document with password.

Annexure

List of Keyboard Shortcuts

Shortcut Key	Function
Ctrl+A	Select the whole document.
Ctrl+B	Makes text bold.
Ctrl+C	Copy the text.
Ctrl+D	Double Underline text.
Ctrl+E	Text is center aligned.
Ctrl+F	Find and Replace.
Ctrl+I	Makes text Italics.
Ctrl+J	Text is Justifed.
Ctrl+L	Text is left aligned.
Ctrl+R	Text is right aligned.
Ctrl+U	Underlines text.
Ctrl+V	Paste the text.
Ctrl+X	Move the text.
Ctrl+Y	Redo last action.
Ctrl+Z	Undo last action.
Left Arrow	Move cursor one character left.

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Right Arrow	Move cursor one character right.
UpArrow	Move cursor one line up.
DownArrow	Move cursor one line down.
Shift+ LeftArrow	Move cursor with selection to the left.
Shift+ RightArrow	Move cursor with selection to the right.
Ctrl+ LeftArrow	Go to beginning of word.
Ctrl+ RightArrow	Go to end of word.
Home	Go to beginning of line.
End	Go to end of line.
Ctrl+Home	Go to start of document.
Ctrl+End	Go to end of document.
Shift+Home	Go and select from the beginning of line.
Shift+End	Go and select till end of line.
Insert	Insert mode on/off.
Page Up	Move one screen up.
Page Down	Move one screen down.
Ctrl+Shift+B	Subscript.
Ctrl+Shift+P	Superscript.

Unicode Tamil Keyboard Typing Chart

a	அ	k	க்	ka	க	ke	கே
aa	ஆ	ng	ங்	nga	ங	kee	கே
i	இ	s	ச்	sa	ச	ko	கொ
ii	ஈ	nj	ஞ்	nja	ஞ	koo	கோ
u	உ	d / t	ட்	da / ta	ட	kau	கௌ
uu	ஊ	N	ண்	Na	ண		
e	எ	w	ந்	wa	ந	we	நெ
ee	ஏ	th	த்	tha	த	wee	நே
ai	ஐ	p	ப்	pa	ப	wo	நொ
o	ஒ	m	ம்	ma	ம	woo	நோ
oo	ஓ	y	ய்	ya	ய	wau	நௌ
au	ஔ	r	ர்	ra	ர		
q	ஃ	l	ல்	la	ல		
		v	வ்	va	வ		
		z	ழ்	za	ழ		
		L	ள்	La	ள		
		R	ற்	Ra	ற		
		n	ன்	na	ன		

j	ja	jaa	je	jee	jo	joo	ji	jii	ju	juu
ஜ்	ஜ	ஜா	ஜெ	ஜே	ஜொ	ஜோ	ஜி	ஜீ	ஜு	ஜூ
sh	sha	shaa	she	shee	sho	shoo	shi	shii	shu	shuu
ஷ்	ஷ	ஷா	ஷெ	ஷே	ஷொ	ஷோ	ஷி	ஷீ	ஷு	ஷூ

Type the following content in Tamil using any interface (Murasu / NHM / Azhagi).

kaNNan - கண்ணன்	joothpur – ஜோத்பூர்
sennai – சென்னை	juulai – ஜூலை
thamizwaadu – தமிழ்நாடு	shiiradi – ஷீரடி
thaajmahaal – தாஜ்மஹால்	hamadu – ஹமது
shaajakaan – ஷாஜகான்	vaashingtan - வாஷிங்டன்

சென்னையில் உள்ள மாநகராட்சிப் பள்ளிகள் சென்னைப்பள்ளிகள் (**Chennai Schools**) என்று அழைக்கப்படுகிறது. இந்த பள்ளிகளை நிர்வகிக்க சென்னை மாநகராட்சயில் கல்வித்துறை (**Education Department**) இயங்கி வருகின்றது. ஒரு இந்திய ஆட்சிப்பணி (**IAS**) அதிகாரி, ஒரு கல்வி அலுவலர் (**Educational Officer**) மற்றும் 10 துணைக் கல்வி அலுவலர்களுடன் (**Assistant Educational Officers – AEO**) இத்துறை செயல்படுகிறது.

Activity

Student Activity

1. To make the students prepare a invitation for school annual day.

2. To make the students create greeting card in landscape format with a picture and a birthday message and distribute to students on their birthday.

Teacher Activity

1. To show a demo to the students how to type a question paper by using indents and bullets and auto numbering, changing the margins.

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Evaluation

Part I Choose The Best Answer

1.   Which is the command to be selected to open the Table Format dialog box.

a. File ->Table properties   b.Format->Table properties

c. Table->Table properties   d.   Edit->Table properties

2.   The bottom of the window which shows the status of the document is:

a. Task bar   b. Title bar   c. Status bar   d. Tool bar

3.   Which is the section of document that appears in the top margin.

a. Head area   b. Foot area   c. Header   d. Footer

4.   The top most part of the window which displays the name of the application

a. Menu bar   b. tool bar   c. title bar   d. format bar

5.   Changing the default appearance of the text is called

a. Text formatting   b. Page formatting

c. special formatting   d. paragraph formatting

6.   The Find and Replace option is available in which menu?

a. File   b. Edit   c. Format   d. Tools

7.   Which button selects all instances of the search text in the document?

a. Find   b. Find All   c. Replace   d. replace All

8.   Which is the short cut key to go to start of document?

a. Ctrl+Home   b. Ctrl+ End   c. Home   d. End

9.   What is the shortcut key for finding and replacing text in a document?

a. Ctrl + F1   b. Ctrl + F4   c. Ctrl + F5   d. Ctrl +F7

10.   Shortcut key for Undo is

a. Ctrl + E   b. Ctrl + U   c. Ctrl + Z   d. Ctrl + n

Part II

1. What is Text formatting?

2. What are the different packages in OpenOffice writer?

3. State the difference between Propietary software and open source software.

4. How do you make corrections to your document?

5. Name some features of OpenOffice writer.

Part III

1. What is the difference between moving and copying text?

2. What are the different types of orientation?

3. How do you turn off bullets and numbering?

4. What are the different ways to save a document?

5. Write the steps to change the line spacing of text.

Part IV

1. What are the different methods to change margin in writer?

2. What are Header and Footer? How do you insert page numbers?

3. What are the different types of paragraph alignment?

4. Write the steps to find and replace a word with another in OpenOffice writer.

5. What are indents ? How do you apply it in a document?

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INSERTING TABLES, OBJECTS AND PRINTING DOCUMENT

7.1 Working With Tables

A table is a grid with a specified number of rows and columns. A well-designed table can help readers understand better what you are trying to convey.

7.1.1. Different Techniques To Insert Table

There are two methods to create a table :

- Using table Icon
- Using Insert Table dialog box

Using Table Icon

To insert a table quickly from the standard tool bar:

1. Place the insertion pointer where you want the table to appear.

2. Click the down arrow on the right side of the Table icon on the standard toolbar.

3. In the drop down grid, move the mouse to select the number of rows and columns for the table.

4. The table will appear at the location of the insertion pointer.

Using The Insert Table Dialog Box

To insert a table with more control over the settings and properties, use the Insert Table dialog box. To open the dialog box, click **Table → Insert → Table or Ctrl +F12.** The Insert table dialog box appears as shown in Figure 7.1:

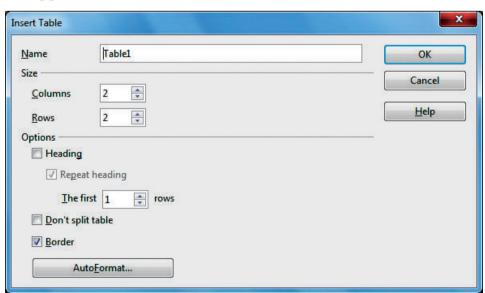*Figure 7.1 Insert Table Dialog Box*

- In the Name text box give a suitable name to the table.

- Specify the number of columns and rows either using spin arrows or enter the value directly.

- Click the **Heading** check box to make the first row of the table as heading, automatically the **Repeat heading** check box will be enabled to repeat the heading row when the table spans more than one page.

- Select the **Border** check box to display table with grid.

- Click **OK** button to create a table.

Entering data into theTable :

Once the table is created with the specified number of rows and columns, you are ready to enter data.

The table is normally created with uniform row height and column width in the entire area. The insertion pointer is placed in the first cell(intersection of row and column) and you can start typing the text into the cell. You can easily move from one cell to the next cell towards right by pressing the **Tab** key and press

Shift + Tab to move towards left. Once the table is created the Table formatting toolbar appears on the formatting toolbar as shown in Figure 7. 2. This toolbar can also be opened by **View → Toolbars → Table**.

7.1.2 Inserting And Deleting Rows And Columns

Inserting Rows

To insert rows in a table there are different ways :

1. The easiest way to add a row is to press **Tab** from the last cell.

2. To insert a single row anywhere, place the insertion pointer in that particular cell and click the **Insert row** icon from the Table Formatting toolbar.

3. To insert more than one row, click **Table → Insert → Rows,** the Insert Rows dialog box appears as shown in Figure 7.3, enter the of value using spin arrows or type the number directly. In the position option, select Before or After radio button to specify the position of the row.

4. Click OK button.

Figure 7.2 Table Formatting toolbar
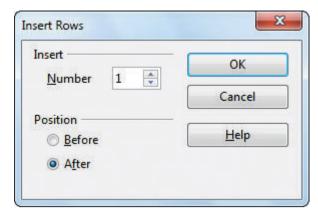
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Figure 7.3 – Insert Rows dialog box

Inserting Columns

To insert columns there are different ways

1. Place the insertion pointer in the particular column and click the **Insert column** icon to insert a blank column right of the insertion point.

2. To insert more than one column, place the insertion point in the particular column and click **Table → Insert → Column,** the insert column dialog box appears as shown in Figure 7.4, enter the value using spin arrows or type the number directly.

3. In the position option, select Before or After radio button to specify the position of the column.
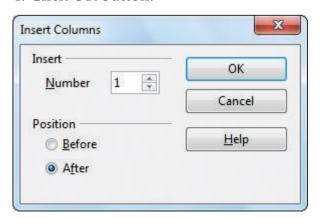
4. Click OK button.

Figure 7.4 – Insert Columns dialog box

Deleting Rows And Columns

To delete rows and columns:

1. To delete a single row, place the insertion pointer in the row or to delete more than one row, select the rows and to be deleted and click delete row icon from the Table Formatting tool bar (or) select **Table → Delete → Rows**, the selected row/ rows will be deleted.

2. To delete a single column, place the insertion pointer in the column or to delete more than one column, select the columns and to be deleted and click delete column icon from the Table Formatting tool bar (or) select **Table → Delete → Columns**, the selected column/ columns will be deleted.

Deleting Contents of A Table

1. To delete the contents of a table :

- Select the contents of the table to be deleted and click **Delete** key, The contents will be deleted, the table will remain as it is.

Deleting An Entire Table

1. To delete the entire table :

- Select the entire table by **Edit → SelectAll** or **Ctrl + A**

- Click **Table → Delete → Table**

- The entire table is deleted.

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7.1.3 Merging and Splitting Cells

To merge a group of cells:

1. Select the cells to merge.

2. Click Table → Merge Cells or click merge cells icon or Right Click → Cell → Merge,

3. The selected cells will be merged into a single cell.

To split a single cell:

1. Place the insertion pointer inside the cell.

2. Click Table → Split Cells or click split cells icon or Right click → Cell → Split, the split cells dialog box appears as shown in Figure 7.5.
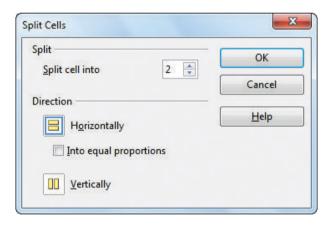

Figure 7.5 Split cells Dialog Box

3. Select the number of cells to split using spin arrows or enter the value directly.

4. Select the direction of the split, horizontally (for rows), or vertically (for columns).

5. A single cell is split into the desired number of rows and columns.

7.1.4 Resize the position of Table

A newly created table will occupy the entire width of the page area by default. The table can be resized as per our requirement:

- To resize a table quickly, move the mouse over the table edge until the cursor becomes a double headed arrow, and drag the border to its new desired position.

- To resize a **row height / column width** using Mouse :

To resize row height

- Move the insertion pointer over the horizontal border for the row height now the insertion point will change into double headed arrow , click and drag to resize the row height.

To resize column width

- Move the insertion pointer over the vertical border for the column width now the insertion pointer will change into double headed arrow , click and drag to resize the row height.

To resize column width using dialog box

- To give precise measurement for column width, Click **Table → Table Properties**, the Table Format dialog box as shown in Figure 7.6
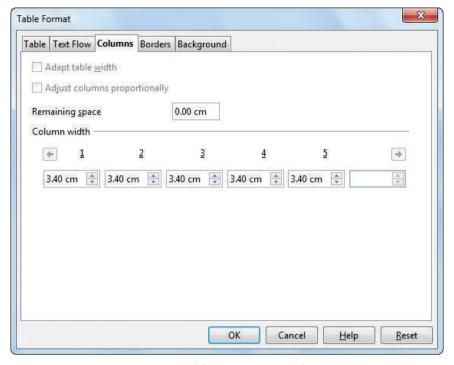
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Figure 7.6Table Format Dialog Box

- For resizing column, click the Columns tab. In the column width spin box enter the new column width or use spin arrow for the columns.

- Click OK button.

- The width of columns are resized as per the new values.

7.2 Formatting The Table

Formatting a table involves formatting of the table layout, formatting of the table text, changing borders, background and autoformating.

7.2.1 Changing Background

To change the background of a table in a document:

Place the insertion pointer inside the table.

1. Select **Table → Table Properties.**

2. Select the **Background** tab inside the Table Format dialog box as shown in Figure 7.7.

In the **For** section, choose to apply the background to the cell, row or table.

- **Cell:** To apply background to a cell or a group of selected cells.

- **Row:** The background will be applied to the entire row or group of selected rows.

- **Table:** The background will be applied to the entire table.

3. In the **As** section, choose to apply a color or graphic:

- To apply **color**, select the color from the color palette and click **OK** button.

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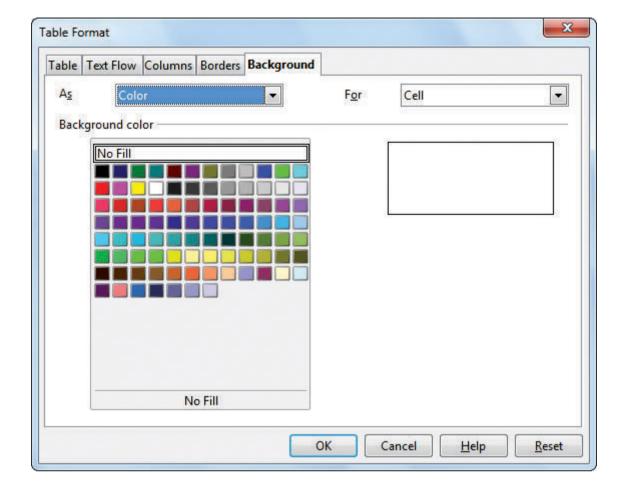
Figure 7.7 Table format dialog box - Background

- To apply graphic, select **Graphic**, click on the browse button to select the required image file and click **OK** button. The image appears in the selected cell as background.

7.2.2 Changing Text Direction In Table

To change the text direction

- Select the text to change the direction in the cell.

- Select **Format → Character,** character dialog box appears.

- Click Position tab, in the Rotation / scaling option,

- Select the required rotation angle(0, 90, 270, Fit to Line) and click OK.

7.2.3 Changing Table Border

To change the table border, select **Table → Table Properties,** the Table Format dialog box appears, select Borders Tab , you can set the borders for a table or a group of cells.

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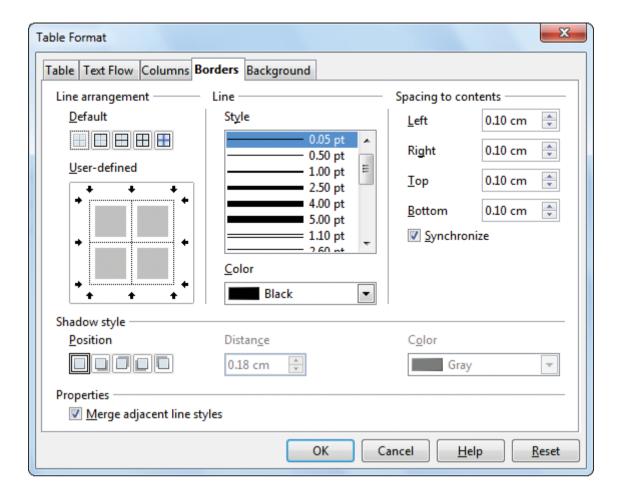
Figure 7.8Table format dialog box to apply borders

Properties of Border

- Line arrangement specifies how the borders apply. Writer provides five arrangements as shown in Figure 7.9, you can modify the arrangement by clicking on the line arrangement you want to customize.
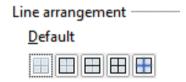
Figure 7.9 Line Arrangement

- **Line** option specifies the border style.

- **Color** option helps to select the color of border line.

- **Spacing** to contents option specifies how much space to leave between the border and cell contents.

7.2.4 Autoformating Table

The AutoFormat option helps to format the table with predefined styles. This is a simple and easy way to format tables. AutoFormating can be applied by :

- Create a Table with the desired number of rows and columns.

- Click **Table → AutoFormat**

- A set of already designed styles with predefined names are available in the Auto Format dialog box as shown in figure 7.10.

- Select the desired style and click OK button.

- The selected style is applied into your table.

Figure 7.10 Auto format Dialog Box

7.3 Inserting Formulae in Tables

We can use formulae in Writer to perform spreadsheet like calculations easily.

To perform calculations on the data in the table

- Create a Table with the following data:

| Item sold	Jan	Feb	Total
Books	15	70	
Pens	30	50	
Ruler	25	25	
Total Goods			

Click in the empty cell where you want a calculation.

- Choose Table → Formula or press F2 and you will get the spreadsheet-like toolbar with the formula entry field.

Figure 7.11 Formula Tool bar

- If you want to add a range of cells then in the current cell type = <B2:B4>and press Enter key. The total will appear as given in the example below.

NOTE

This method is applicable only to find summation of the selected range.

Item sold	Jan	Feb	Total
Books	15	70	
Pens	30	50	
Ruler	25	25	
Total Goods	**=<B2:B4>**		

- The formula Toolbar as shown in Figure 7.11 can be used when the user want to perform other arithmetic calculations.

Item sold	Jan	Feb	Total

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Books	15	70	=<b2>+<c2>
Pens	30	50	
Ruler	25	25	
Total Goods	**70**		

- If you want to perform calculations using individual cells, individual cell reference should be placed within <> .

Note : In the table structure the columns are labelled as A, B, C……and the rows are numbered as 1,2,3,…… etc. For Ex. The first cell is referred as A1, B1 etc.

- In the above example, to find the sum, of the books purchased in January and February, the total is calculated using the formula =<b2>+<c2>.

- A subtraction formula for instance is given as =<b2>-<c2>.

- If you want something more complicated than addition, subtraction, multiplication, and division, click on the formula dropdown list as shown in Figure 7.12.
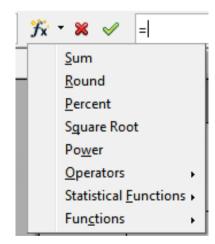
Figure 7. 12 Formula dropdown list

Workshop

7-1 Open a new document.

- Using icon or table menu create the given table with 5 rows and 6 columns with the labels S.No., Name, Maths, Phy, Che and Total

- Calculate the Total of three subject using SUM functions.

- After the sixth row add a new row and type suitable data for the new row.

- Delete the second row using icon or command.

- Using icon or command after the second column add a new column and type suitable data for the new column.

- Delete any one column using icon or command.

- Save and close the document.

7-2 Open the document created in workshop-7.1.

- Do the following options

- Change the border style and border line width for one table.

- Change height and width for the row and column respectively.

- Save and close the document.

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7-3 Create a new document.

- Create a 4 x 4 table using icons in toolbar or using commands.

- Split any one row/ column in one given table into more than one cell using icon or command.

- Merge any two or more row / column in the given table using icon or command.

7-4 Open the document created in workshop-7.1.

- Delete the table content.

- Perform all table formatting options for this table.

- Add two more rows and columns and also delete the rows and columns.

- Save and close the document.

7.4 Inserting Objects

7.4.1 Inserting And Formatting Pictures

Open office Writer has the ability to insert and edit images in a more simple way. The picture gallery of the writer consists of a collection of images from which the desired image can be selected and inserted into the document. To insert an image from a file, the steps are as follows:

- Place the insertion pointer where you want the image to appear

- Select **Insert → Picture → From file**

- The insert picture dialog box appears where the picture gallery opens from which the desired picture can be selected.

- If the picture is not in the gallery, then browse the picture from the folder, choose the desired picture.
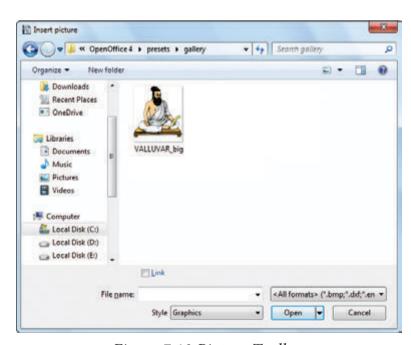
- Click on the Open button.
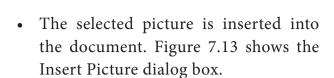
Figure 7.13 Picture Toolbar

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- The selected picture is inserted into the document. Figure 7.13 shows the Insert Picture dialog box.

Formatting Pictures

Using Picture toolbar of Writer one can modify the format of the inserted picture.

A click inside the picture displays the picture toolbar as shown in figure 7.14 which helps to format the picture by cropping the picture, adding borders, set the height and width, change the background color and perform various other formatting.

Figure 7.14 Picture Toolbar

- To increase and decrease the size of the picture, click and drag at the four corners.
- Clicking on Crop displays the cropping handles, Click and drag a handle to crop an image. Click the Crop command to deselect the crop tool.

- Clicking on Default drop down arrow displays options like Black and white, Grey scale or Water mark (background) while default option displays the picture as original.

- Clicking on **Flip horizontally icon** flips the picture horizontally.

- Clicking on **Flip vertically icon** flips the picture vertically.

- Clicking on **Transparency icon** helps to adjust the clarity of the picture in %.

7.4.2 Inserting Special Character And Equations

Many symbols which are used in a mathematical equation like alpha (∞), beta (β), pi (π) etc., are not available on the standard keyboard. However,representing these characters are very much essential in mathematical equations. To insert such characters, the procedure given below is followed:

Figure7.15 Insert Symbol Dialog box

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- Place the insertion pointer in your document where you want the character to appear

- Click on the **Insert** → **Special character**

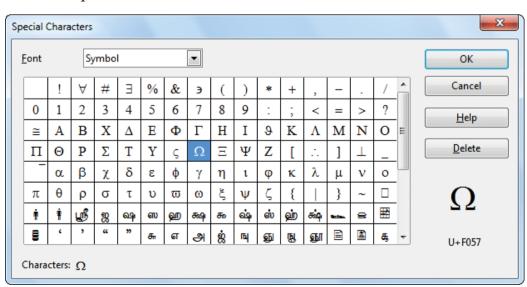- The Special character dialog box appears from which the desired symbol can be selected by clicking on the character.

- Click the OK button to insert the special character.

The insert symbol dialog box is displayed in Figure 7.15.

Open office writer helps to insert mathematical equations using the various symbols. These equations can be inserted by following the steps below:

- Click on the **Insert** → **Object** → **Formula**

- The equation editor opens at the bottom of the screen.

- Click in the equation editor and type the equation.

- To include symbols in the equation Right-click in the equation editor and select the symbol from the pop-up menu.

- Click inside the document to include the equation in the document and this will automatically exit the control from equation editor.

- Double-click on a formula to edit the equation.

7.4.3 Inserting And Editing Shapes

OpenOffice writer uses the drawing tools, to create various shapes by using the Drawing toolbar. Select **View** → **Toolbars** → **Drawing** to display drawing toolbar as on Figure 7.16 which contains various Drawing tools.

To use a drawing tool:

- Click in the document where you want the drawing.

- Select the **tool** from the **Drawing toolbar**. The mouse pointer changes to a **drawing-functions pointer.**

- Move the **cross-hair pointer** to the place in the document where you want the graphic to appear and then click-and-drag to create the drawing object. Release the mouse button. The selected drawing function remains active, so you can draw another object of the same type.

- To cancel the selected drawing function, press the Esc key or click on the Select icon on the Drawing toolbar.

Figure7.16 Drawing toolbar

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- You can now change the properties (fill color, line type, weight, etc.) of the drawing object using the **Drawing Object Properties toolbar.**

- Click on **T** Icon to create a text box and type any amount of text which can be moved anywhere into the document.

7.4.4 Inserting Page Break

OpenOffice Writer inserts a page break automatically when the content exceeds a page, this is known as soft page break. Sometimes the user need to insert a page break manually, it is called as hard page break.

1. Place the insertion pointer in the document where the page break is to be inserted.

2. Select **Insert → Manual Break,** the Insert break dialog box appears as given below:

Figure 7.17 Insert Break dialog box

3. Under the type option choose Page break and click **OK** button .

4. A page break is inserted at the current location.

7.4.5 Inserting Word Art

WordArt is a feature in OpenOffice Writer which includes effects such as shadows, outlines, colors, gradients, and 3D effects that can be added to a word or phrase to make it more presentable and attractive.

To insert WordArt , the steps to be followed are :

- Click the Fontwork icon on the Drawing toolbar.

- Fontwork gallery window with various font work.

- Double-click on the required Font work style, and type the required word or phrase.
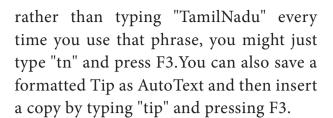
The WordArt dialog box is displayed as in Figure7.18.

Figure 7.18WordArt Dialog Box

7.4.6 Inserting Auto Text
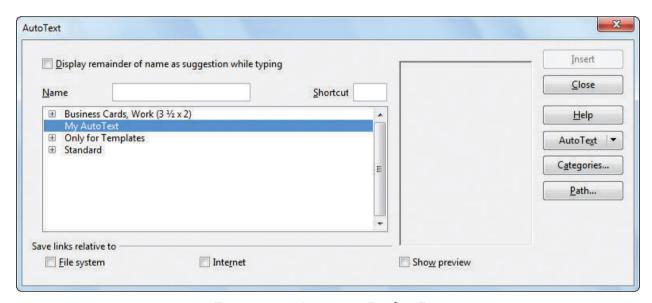
AutoText allows the user to assign text, tables, graphics and other items to a key or key combination. For example,

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rather than typing "TamilNadu" every time you use that phrase, you might just type "tn" and press F3.You can also save a formatted Tip as AutoText and then insert a copy by typing "tip" and pressing F3.

To assign AutoText shortcut to some text, the steps are as follows:

1. Select the text and it is highlighted.

2. Select **Edit** → **AutoText** (or press **Ctrl+F3**).

3. In the Name textbox, type the shortcut. Writer will automatically show one letter shortcut in the Shortcut textbox.

4. Click the ▼ of the AutoText button on the right and select New (text only) from the menu.

5. Click Close to return to your document.

6. Once the entry is created, to insert the auto text into the document, place the insertion point where the text is to be inserted and click **Ctrl+F3.**

7. Select the name from the list of entries and click Insert button or type the shortcut and press F3.

8. The auto text is inserted into your text.

Figure 7.19 Auto text Dialog Box

Note

If the only option under the AutoText button is Import, either you have not entered a name for your AutoText or there is no text selected in the document.

7.5 Page Preview, Setting the printer and Printing a Document

7.5.1 Preview the document to be printed

It is a good practice to preview the document before taking the print out. The steps to be followed to preview the document :

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1. Click **File → Page Preview,** or click the **Page Preview button** . The Writer displays the Page Preview toolbar displayed on Figure 7.20.

Figure 7.20 Page Preview Toolbar

2. In the page preview toolbar click **Multiple pages** icon to display multiple pages.

3. To close the preview click on **Close Preview** button.

7.5.2 Setting the Printer and Printing

The following are some steps to change the printer setting :

1. Click **File → Print** or **Ctrl+P** or Print File icon which opens the Print dialog box that appears as shown in Figure 7.21.
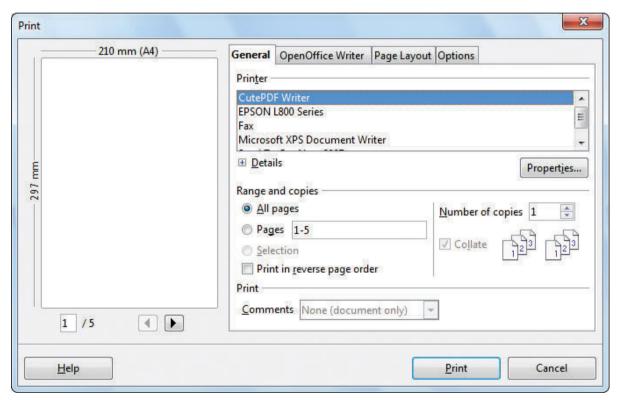
Figure 7.21 Print Dialog box

2. Click General tab.

3. Select the required printer from the list of printers

2. Under Range and copies section : select **All pages** option to print all pages, select **Pages** option to specify the particular page or page range.

3. Specify **Number of copies** using spin arrows.

4. Click **Print** button.

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7-5 Open the document created in Part-1 workshop-1.

- Download images related to Dr. A.P.J ABDUL KALAM from internet and insert the images in the document at required place using command or icon.

- Open the document in Part-III – workshop-1 , download images related to the content from internet and insert the images at required place.

- Save the document and close.

7-6 Open a new document.

- Using the commands to insert special characters, special symbols

- Type the following equations (i) $A\alpha+Br+c\beta$ (ii) $\pi r^2 h$.

- Using drawing toolbar insert various drawings/ shapes in your document

- Save and close the document.

7-7 Open the document created in workshop-2

- Using Autotext command or keyboard shortcut create shortcut for "Vital Information Under Seize" as "VIRUS" and make it appear in one document.

- Using Print icon change printing attributes, preview and print the document.

7-8 Open the document created in workshop-4 of part I of ch-6

- Insert suitable picture of a circle.

- Type the formula for the circumference of a circle using insert special character option.

- Using drawing tools draw the following in the document.

- Print the document using print command.

Activity

Student Activity

1. Based on the concept of calculation using formulae, make the students type the Mark sheet in a table and calculate their total and average in writer.

2. Make the students prepare a invitation for school annual day with school name as Watermark.

3. Let the students prepare their class timetable in table format and format it in an attractive manner.

Teacher Activity

1. To show a demo to the students how to type a question paper by using formulas and special characters, changing the margins and printing in the practical session.

2. To show the students a demo of inserting a picture and applying crop , color changes, background and others features to modify it and make more attractive.

Evaluation

Part I Choose the Best Answer

1. To give precise measurement for column width, which command gets the Table Format dialog box?

   a. File→Table properties   b.Format→Table properties

   c. Table→Table properties   d. Table →Table format.

2. Which option helps to assign text, tables, graphics and other items to a key or key combination?

   a. Autoformat   b. Automatic

   c. Auto text   d. Autographics

3. Which command on the insert menu is used to insert a page break in the document?

   a.ManualBreak   b. Hard page break

   c. Section break   d. Page Break

4. What is the short cut key to open the insert table dialog box?

    a. Ctrl + F5   b. Ctrl + F8

    c. Ctrl + F10   d. Ctrl + F12

5. Which icon on the drawing toolbar gets you a text box?

    a. Text icon   b Text box icon

    c. Draw icon   d. Draw box icon

Part II Very Short Answers

1. How do you insert pictures in to your document?

2. Write the steps to insert special characters in a document?

3. How do you split and merge cells in a table?

4. What is the use of WordArt in writer?

Part III Short Answers

1. Write about the drawing toolbar

2. How do you insert rows and columns?

3. How do you change the clarity of the picture in background?

Part IV Explain

1. Write the steps to create autotext for a word.

2. How do you resize the position of a table?

3. How do you format pictures?

4. Write the steps to preview before printing and steps in printing a document.

5. Write the steps to compute the sum for a set of data in a table by using formulae.

Mail Merge & Additional Tools

8.1 Mail Merge

A common word processing task is to create a document with different mailing addresses and send to different people. The mailing feature in Word processor can help the user to organize to address data, merge it into a document and print it out in the desired format.

The main feature of Word processor is **Mail Merging**. Merging a list of names and addresses to a single letter that can be sent to different people in their names and addresses.

Multiple copies of a document can be sent to a list of different recipients (form letters) through the following facilities.

• Mailing

• labels

• Envelopes

All these facilities, are related to a registered "data source". The Variables refer different field of data source.

Creating data source for mail merge:

A data source is a database containing the name and address or records of other information from which a mailing list may be derived. Printing the mailing labels and envelopes does not require data source facilities.
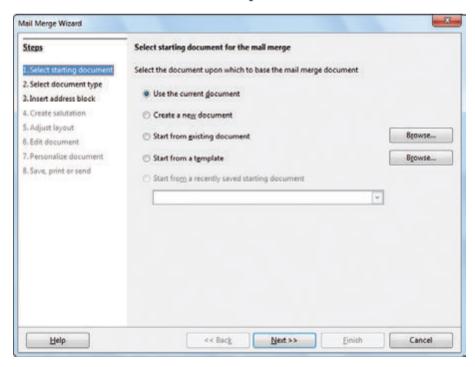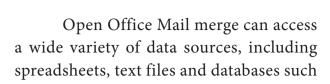
Figure 8.1: Mail Merge Wizard – Select Starting document

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Open Office Mail merge can access a wide variety of data sources, including spreadsheets, text files and databases such as MySQL, Adabas, and ODBC

Thefollowing example uses a spreadsheet with the following column (field) headers: Title, First name, Last name, Address, State/County, Country, Post Code, Gender, and Points. The mail merge wizard is shown in Figure 8.1. The following steps perform mail merge operation.

Step 1: Choose Mail Merge

Tools -> Mail Merge

Step 2: Select starting document

This step has four options:

- Use the current document.

- Create a new document.

- Use a template.

- Use an existing document.

- Choose "Create a new document" option.

- Click Next Button

Step 3: Select document type

This step has two options:
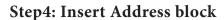
- Letter

- E-mail Message

Choose "Letter" as option - to send letters to a group of recipients.

Click Next button

Figure 8.2 Choose document type

Step4: Insert Address block

This step helps to select the address list to be merged with the document.

This step has four sections

Click" Select different Address list" button to choose the address list from an existing file or create a new address file.

Click "Add" button to include the existing data source.

Click "Create " to create a data source.

This window shows default fields for the address.

Click "Customize" to add or delete or rename fields

Note

Minimum three fields must be selected when the user creates an address list.
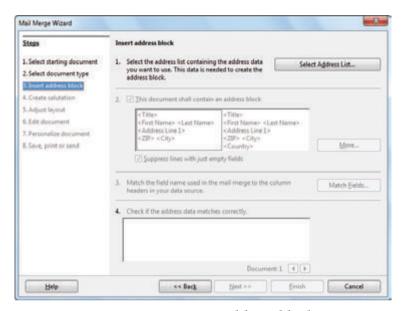
Figure 8.3. Insert Address block
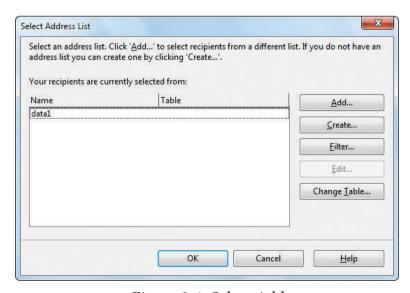
Figure 8.4. Select Add

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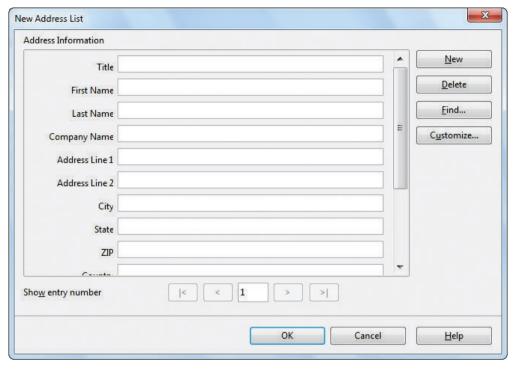
Figure 8.5 New Address List
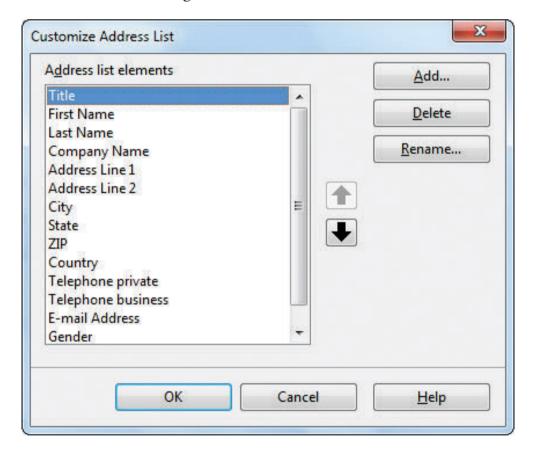
Figure 8.6 Customize Address List

After selecting the required fields for the address list Click OK button.

This will get back to the previous window, where the user can add records.

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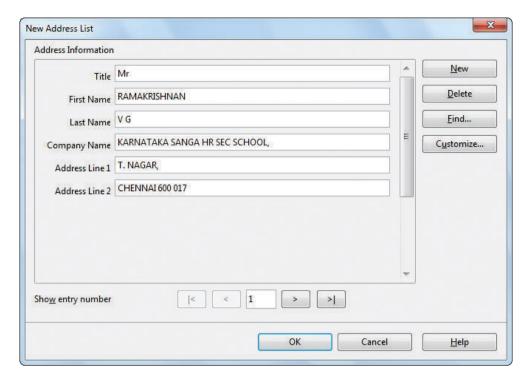
Figure 8.7 Filled New Address List

Click New to add more records

If the user wants to delete any particular record, select the record using navigation buttons and then Click Delete. Click OK The "Save As "dialog box appears to save the records.

This returns back to "Select Address List" dialog box. Click Ok
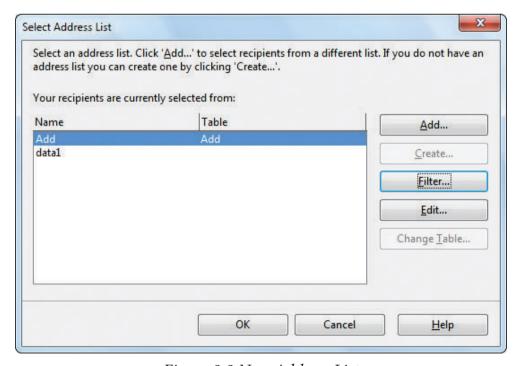
Figure 8.8 New Address List

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Mail merge wizard main window appears, Click Next
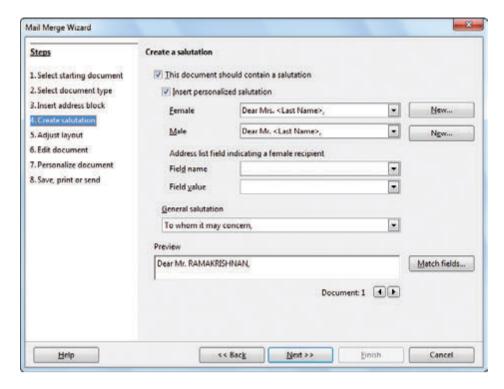
Figure 8.9 Create a Salutation in Mail Merge Wizard

This is an optional window to add general salutations to the letter.

Click Next   The Adjust Layout window appears
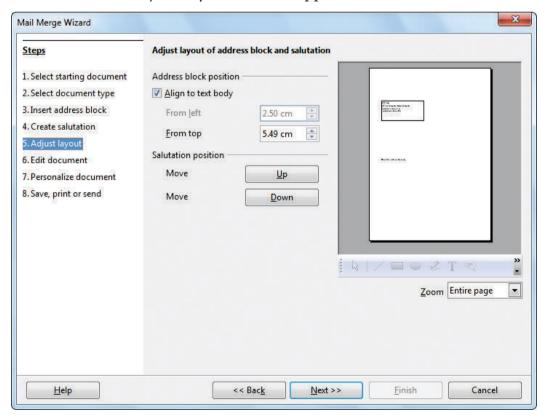
Figure 8.10 Adjust layoutof addressblock and salutation

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This helps us to modify the position of the address label and general salutation.

Click Next

Step 5: Edit document helps us to add or modify the content of the letter.

When the user click "Edit document" mail merge wizard window shrinks and the control is transferred to the document enabling the user to modify the content.
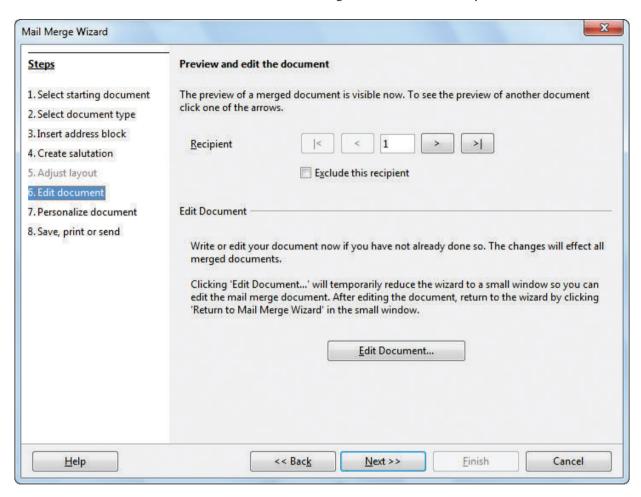
Figure 8.11 Preview and Edit document

After editing the document. Click on "Return to Mail Merge Wizard" from the pop-up that appears on the top left corner of the document to return back to mail merge wizard window.

Figure 8.12 Minimized mail merge wizard

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Click Next

Step 6 : Personalize Document window appears, this window helps to add specific comments to selected records, Click Next
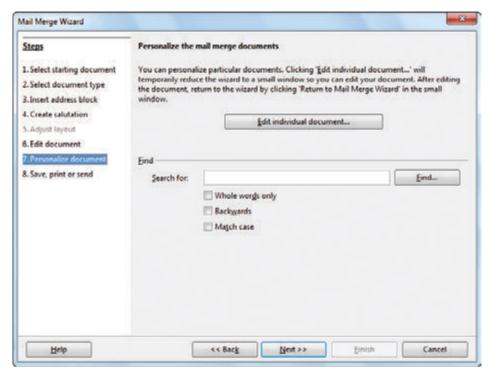
Figure 8.13 personalize the mail merge documents

Step 7: The save as dialog box is used to save the created document by giving a suitable name.
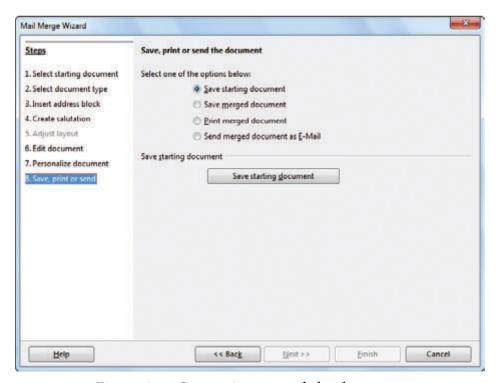
Figure 8.14 Save print or send the document

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One can also save, merge, print and send merged document as E-mail using this step.

Click finish to view the mail merge on the screen.

8.2 Additional Tools

8.2.1 Spell Check

The documents prepared using word processing software should be without any spelling mistake. For this purpose OpenOffice Writer includes a dictionary and spell check program. OpenOffice Writer can identify the spelling mistakes as the document is typed or after the entire document is typed.

8.2.2 Auto spell check

Auto spell check option checks each word as it is typed and displays a wavy red line under any misspelled words. Once the word is corrected, the red wavy line disappears. This can be done through clicking the icon. **ABC**

To perform a separate spelling check on the document (or a text selection) click the Spelling and Grammar button. This checks the document or selection and opens the Spelling dialog box (Figure 8.15) if any misspelled words are found. This can be achieved by clicking the icon. **ABC**
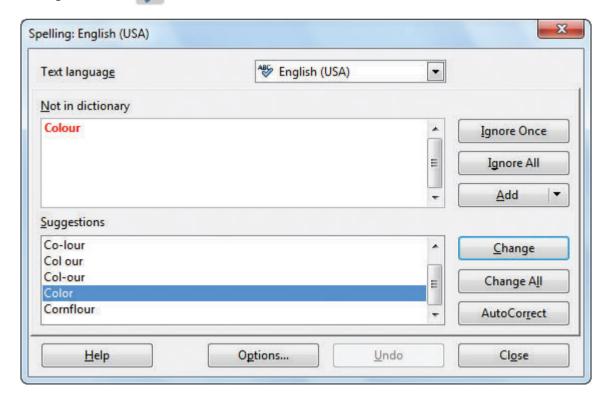
Fig: 8.15 The Spelling dialog box

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Here are some more features of the spelling tool:

- Right-click on a word with a wavy underline, to open a powerful context menu. Correct words can be selected from the suggested words on the menu. The selection will replace the misspelled word with correct word.

Other menu options are discussed below.

- The dictionary language can be changed (for example, Spanish, French, or German) from the Spelling dialog box.

- The new words can be added to a dictionary. Click Add in the Spelling dialog box and pick the dictionary to add to it.

- The Options dialog box of the Spelling tool has a number of different options such as whether to check uppercase words or words with numbers. Words can be added or deleted through this option. Dictionaries also can be added or deleted through custom directories.
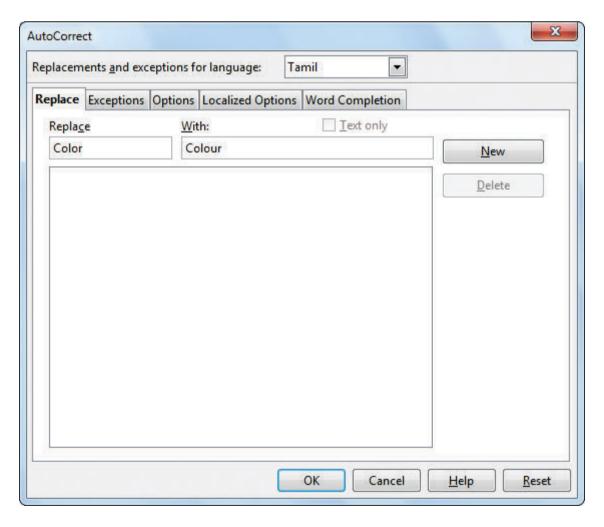
Figure 8.16 AutoCorrect wizard

8.2.3 Automatic correction

AutoCorrect function has the facility to correct the common misspellings and typing errors, automatically. For example, "hte" will be changed to "the" which can be done through, **Tools → AutoCorrect** to open the AutoCorrect dialog box which provides the chance to change the misspelled word with the correct word. To make an auto correct entry

- Select **Tools → AutoCorrect**
- AutoCorrect dialog box appears
- Click Replace Tab
- In replace box, type the misspelt word
- In with box , type the correct word
- Click New.

AutoCorrect is automatically turned on. To turn it off, uncheck **Format → Autocorrect → While Typing**. AutoCorrect can be used as a quick way to insert special characters. For example, (c) will be autocorrected to ©. You can add your own special characters.

Do the necessary steps to correct the word "comupter" into "computer" automatically

1. Goto **Tools → Autocorrect option**
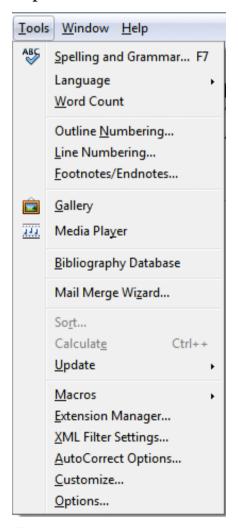
Figure 8.17Auto correct menu

2. Click the replace tab and type "computer" in Replace text box and "computer" in with textbox.

- Then Click OK.
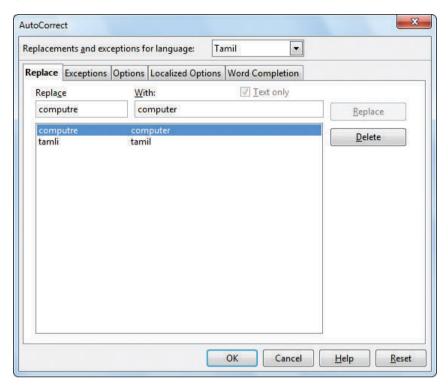
Figure 8.18 Autocorrect dialog box

3. The word "Comupter" is replaced with "Computer" and displayed in the list.
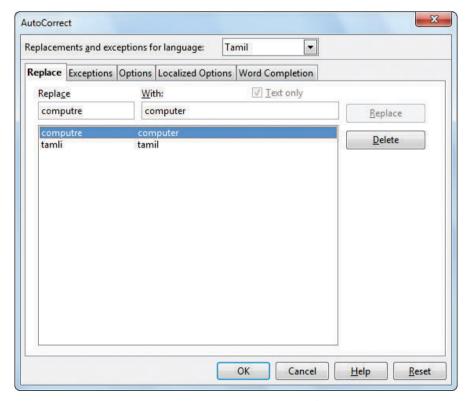
Figure 8.19 Auto correct list

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After entering this, when you type "comupter" in the document, it will be automatically changed to the correct spelling "computer".

Counting the words in a selection

Select the required text and choose **Tools → Word Count.**

This displays the number of words and characters in the selected text. Word count dialog box appear as shown in Figure 8.20
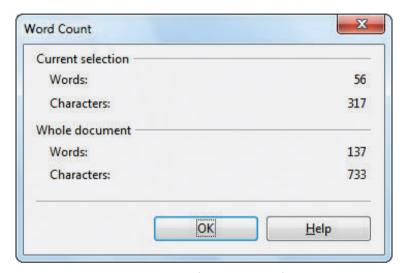
Figure 8.20 Word Count Dialog Box

Also the number of words and characters in the entire document is found from **File→Properties → Statistics**. (Figure 8.21)
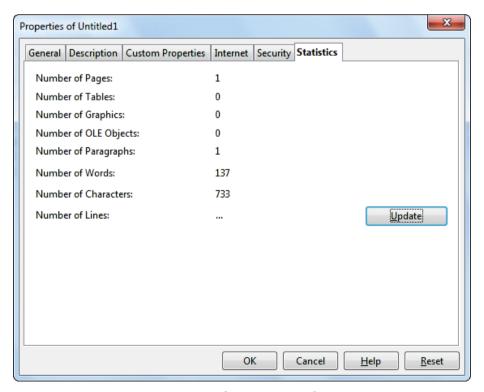
Figure 8.21 Word count in a document

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Activity

Student Activity1

Using mail merge feature create aninvitation to inviting parentsto visit science exhibition at your school.

Student Activity 2

Create Birthday Invitation and use Mail merge to send it your friends

Staff Activity 3

Using mail merge feature create an invitation to inviting parent to attend parents meeting at school.

Evaluation

Part I Choose The Best Answer

1. To send a document to a number of people whose details are stored in the table. Which feature would you use to send the document to all the people?

    a. Turn on the Online Collaboration feature

    b. Turn on the Track Changes feature

    c. Use the Mail Merge feature

    d. Enabling Hyperlink

2. A -------is a database containing the name and address records (other information) from which a mailing list

    a. data source   b. Word Processor   c. Text File   d. Page Layout

3. A ----- is a computer application that is used to create, edit, and organize a document.

    a. Word processor   b. Spreadstttheet   c. Presentation   d. Database

4. Which one is not a Mail Merge feature?

    a. Send Mail content to many recipients   b. Creating and storing data

    c. Labels   d. Calculator

5. Which of the following option is not responsible for external address book creation wizard?

    a. Mozilla/Netscape   b. LDAP Address Data

    c. Outlook address book   d. windows system address book

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6. Which menu option of the menu bar is used to Mail Merge a document?

   a. View   b. Format   c. Table   d. Tools

7. Which among the following list of files cannot be used as an Address List in Mail Merge?

   a. OpenOffice Calc   b. Microsoft Excel

   c. OpenOffice Base   d. OpenOffice Impress

8. Spelling errors can be viewed in a document through_____.

   a) Green wavy line   b) Blue wavy line

   c) Black strike   d) Red wavy line

9. The alternate words in Open Office Writer are called, ____

   a)Antonyms   b) Thesaurus   c) Comments   d) Meanings

Part II Very Short Answers

1) What is Mail Merge?

2) What is Address book?

3) What is Data source?

4) How will you add your name to the dictionary?

5) How will you replace a misspelled word with a correct word?

Part III Short Answers

1) List the advantages of the Mail Merge feature

2) List out the data sources in Mail Merge

3) Open a document and find the number of words available in the document

4) Write down the steps to find the number of words in a paragraph

Part IV Explain

1) Explain Mail Merge feature

2) Explain Address book feature

3) How to create and storing data in mail merge

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Active file	–	நடப்புக் கோப்பு
Algorithm	–	நெறிமுறை
Alignment	–	இசைவு
Anti–virus	–	நச்சுநிரற்கொல்லி/நச்சுநிரல் எதிர்ப்பான்
Application software	–	பயன்பாட்டு மென்பொருள்
Artificial intelligence	–	செயற்கை நுண்ணறிவு
Binary numbe	–	இரும எண்
Bit	–	நுண்மி
Browser	–	உலாவி
Browsing	–	உலாவுதல்
Buffering	–	இடையகப்படுத்துதல்
Central Processing Unit (CPU)	–	மையச் செயலகம்
Chat	–	உரையாடல்
Checkbox	–	தேர்வுப்பெட்டி
Communication	–	தொடர்பு
Compact disc (CD)	–	குறுவட்டு/இறுவட்டு
Computer network	–	கணினி வலையமைப்பு
Condition	–	நிபந்தனை
Control key	–	கட்டுப்பாட்டு விசை
Control structure	–	கட்டுப்பாட்டு அமைவு
Control unit	–	கட்டுப்பாட்டு பிரிவு
Copy	–	நகல்
Data	–	தரவு
Decimal number	–	பதின்ம எண்
Desktop	–	முகப்புத் திரை
Devices	–	சாதனங்கள்
Disk drive	–	வட்டு இயக்கி
Distributed Computing	–	பரவலாக்கப்பட்ட கணிப்பொறி திறன்
Document	–	ஆவணம்
Download	–	பதிவிறக்கம்
E–mail	–	மின்னஞ்சல்
Error	–	பிழை
Field	–	புலம்
File	–	கோப்பு
File management	–	கோப்பு மேலாண்மை
Flow chart	–	நெறிமுறை விளக்கப்படம்
Folder	–	கோப்புறை
Font	–	எழுத்துரு
Function	–	செயற்கூறு
GUI	–	வரைகலை பயனர் இடைமுகம்
Hard disc	–	வன்வட்டு
Hardware	–	வன்பொருள்
Icon	–	பணிக்குறி
Information	–	தகவல்
Insertion point	–	செருகும் புள்ளி
Internet	–	இணையம்
Internet protocol address	–	இணைய நெறிமுறை முகவரி
Internet service provider (ISP)	–	இணையச் சேவை வழங்குனர்

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Interpreter	–	வரிமொழிமாற்றி/இடைமாற்று
Intranet	–	உள்வலை
iOS(I phone OS)	–	ஆப்பிள் ஐ–போன் இயக்க அமைப்பு
Keyboard	–	விசைப்பலகை/தட்டச்சுப்பலகை
Keyword	–	சிறப்புச் சொல்
Laptop computer	–	மடிக்கணினி
Log in	–	புகுபதி/உற்புகு
Log out	–	விடுபதி/வெளியேறு
Machine language	–	இயந்திர மொழி
Memory	–	நினைவகம்
Menu	–	பட்டியல்
Micro processor	–	நுண் செயலி
Multimedia	–	பல்லூடகம்
Multitasking	–	பல்பணி
Navigation	–	வழிசெலுத்தல்
Network	–	பிணையம்/வலையமைப்பு
Notation	–	குறிமானம்
Object	–	பொருள்
Operating system	–	இயக்க அமைப்பு
Page layout	–	பக்க வடிவமைப்பு
Password	–	கடவுச்சொல்
Peripherals	–	உபகரணங்கள்
Print	–	அச்சிடு
Printer	–	அச்சுப்பொறி
Program	–	நிரல்
Protocols	–	நெறிமுறைகள்
Reset	–	மீட்டமை
Robotics	–	எந்திரனியல்
Scheduling	–	திட்டமிடுதல்
Security	–	பாதுகாப்பு
Sessions	–	அமர்வுகள்
Shortcut	–	குறுவழி/குறுக்குவழி
Shutdown	–	அணை/மூடு
Software	–	மென்பொருள்
Spooling	–	சுருளாக்கம்
String literals	–	சர மதிப்புருக்கள்
Structured programming	–	கட்டுரு நிரலாக்கம்
Syntax error	–	தொடரமைப்புத் தவறு
Tab	–	தத்தல்
Toolbar	–	கருவிப்பட்டை
Trash	–	மறுசுழற்சிப் பெட்டி
URL	–	(இணைய) முகவரி
Version	–	பதிப்பு
Virus	–	நச்சுநிரல்
Website	–	இணையத்தளம்
Wizard	–	வழிகாட்டி
Word processor	–	சொற் செயலி
Workstation	–	பணிநிலையம்
World Wide Web (WWW)	–	வைய விரிவு வலை

Notes

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