

INFORMATION TECHNOLOGY

Part IV



Computer Science Syllabus for Class IV

Lesson	Title/Topic of the lesson	No.of Periods
1.	Introduction to Windows <ul style="list-style-type: none"> ➤ Desktop components ➤ Display Properties ➤ Operations of Windows ➤ Windows explorer ➤ Files and Folders ➤ Windows accessories ➤ Control panel 	6
2.	History of Computers <ul style="list-style-type: none"> ➤ History of Computers ➤ Generation of Computers ➤ Classification of Computers 	6
3.	Multimedia <ul style="list-style-type: none"> ➤ Introduction ➤ Components of multimedia ➤ Applications of multimedia ➤ Multimedia Software 	6
4.	Internet <ul style="list-style-type: none"> ➤ Introduction to Internet ➤ History of Internet ➤ Internet Service Provider ➤ World Wide Web ➤ Web browsers, Websites and Search Engines ➤ Exploring the Websites 	8
5.	Excel Spreadsheet-Introduction <ul style="list-style-type: none"> ➤ Introduction to MS-Excel ➤ Uses of Excel ➤ Features of Excel ➤ Workbook and worksheet ➤ Data types and entering data in worksheet ➤ Formatting 	9
6.	Excel Spreadsheet–Advanced <ul style="list-style-type: none"> ➤ Formulas and functions ➤ Handling with rows and columns ➤ View menu ➤ Inserting Images ➤ Inserting Charts 	10
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8.	Programming with LOGO–Part-2 <ul style="list-style-type: none">➤ Revision of Logo commands➤ Functions➤ Operation on Procedures➤ Arithmetic operations➤ Working with user inputs➤ Logo Projects	9
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CHAPTER 1

Introduction to Windows

Operating Systems

Operating system is like a manager of an organization. It manages the overall functions of a computer in a systematic manner. It is system software that controls and coordinates the hardware devices of the computer and runs other software and applications on a computer.



The main functions of an operating system are booting the computer, managing system resources (CPU, memory, storage devices, printer, etc.), managing files, handling input and output, executing and providing services for application software, etc.

Examples of operating system: Microsoft Windows, Apple iOS, Android OS, MacOS, Linux, etc.

Windows Operating Systems

The first GUI package Windows 1.0 was introduced in 1985 by Microsoft Inc. and then the first windows based operating system called **Windows 95** was introduced on 15th August 1995. Windows evolved as different versions over the years by incorporating various changes based on the technology developments and research. **Windows 11 is the latest OS version from Microsoft which was introduced on 5th October 2021.** For the sake of availability of software, let us use Windows 10 operating system for learning purpose. Windows 10 combines the features from its previous versions for making it further user friendly for desktops as well as laptops and mobile devices. Some of the features are:



- It is a Graphical User Interface (GUI).
- It has a new style of Start menu.
- It allows you to run several programs at the same time.

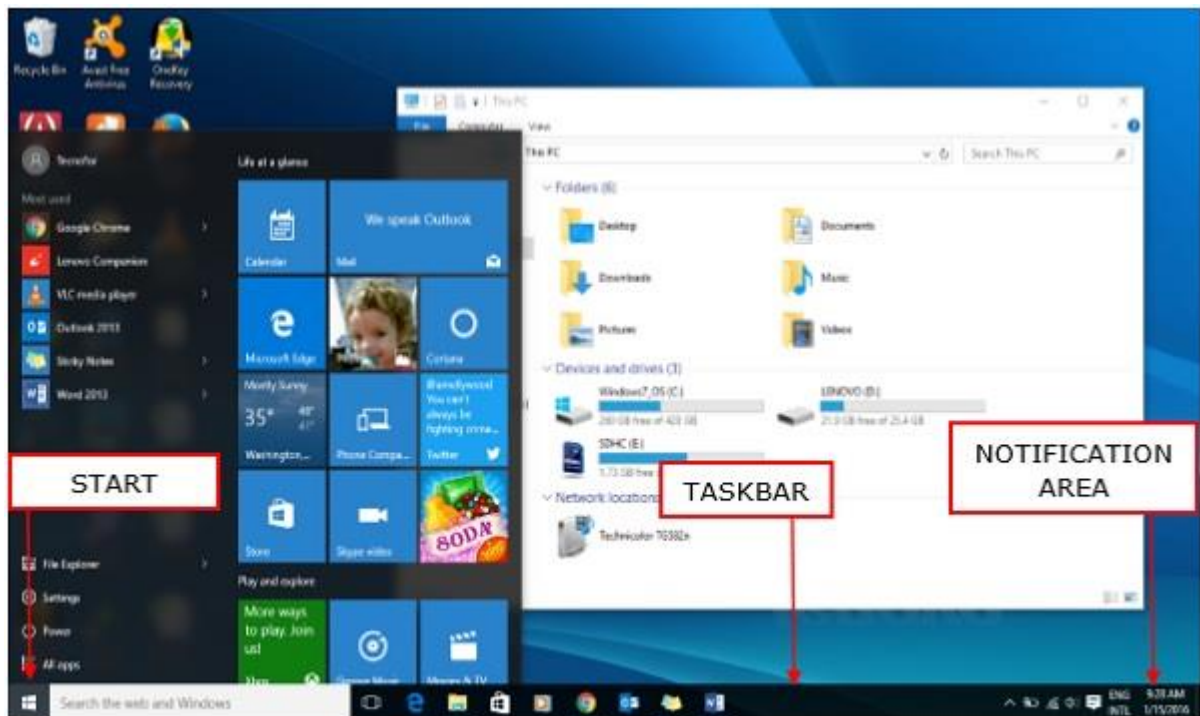


- It supports for higher speed of operation. The process of booting and shut down is simplified and takes very less time.
- It supports for enhanced gaming experience
- User can interact with a computer using voice assistant Cortana, a special feature provided in Windows 10.

The process of loading an operating system into memory is called booting.

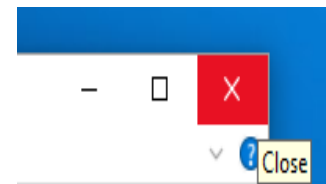
Components of Windows 10

Start the computer by pressing the power button and then the process of booting will begin. It means preparing the computer ready for working with applications and utilities through various devices.



Window is a rectangular box that contains three buttons in the upper-right corner. These are used to minimize, maximize or close the window

- Minimizing means that the window will hide in the Taskbar.
- Maximizing will bring the window to a full-screen size.
- Close button closes the application.



Desktop components

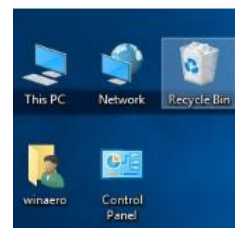
After the booting process, Windows 10 displays the main screen area called desktop. This is like an index of the windows operating system at one place. It can be organized for the convenient of users. There are three major components in desktop. They are

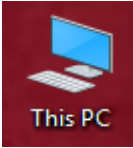
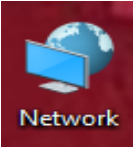


- Icons
- Taskbar
- Desktop background



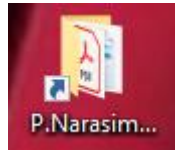
Icons

An icon is a small picture that represents applications, programs, folders or a file. By double clicking on an icon, the corresponding application or software will be opened. Right clicking on an icon displays various properties associated with an icon. The purpose of some of the important icons present on desktop is given below



Name of the icon	Icon	Purpose
This PC		By opening this icon, it displays all the available hard disk drives such as C, D, E etc and other drives for Pen Drive, CD/DVD, important folders etc.
Network		It contains the shared files or devices of the different computers on the network.
Recycle Bin		It is like a dustbin in house. This folder contains all the deleted files. Those files can be deleted permanently or restored by choosing the appropriate options on right clicking the file(s).
Application Icons		It represents application software called MS-Excel. On double-clicking this icon it opens the Excel software.

Shortcuts

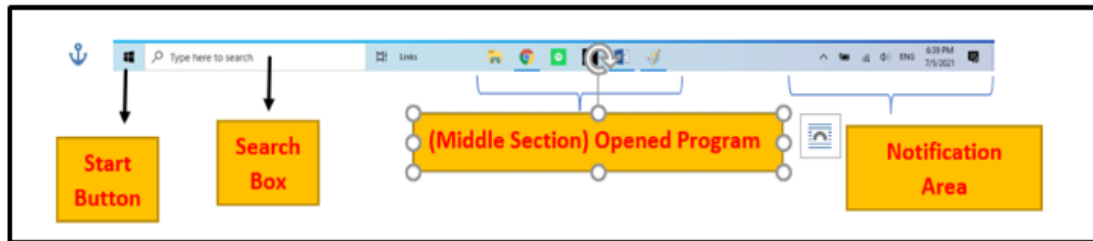


The shortcut icon is like a dummy icon because it is only the reference to the concerned file, folder or application. A small jump arrow symbol at the bottom left corner of an icon indicates shortcut icons.

Taskbar

The most important component of the desktop is the Taskbar. By default, it is present at the bottom of the screen. It contains

- The Start menu – It shows two panels, side by side for accessing the various applications in different ways.
- Search Box – It helps to browse through computer and web
- Opened programs or frequently used applications
- The Notification Area – It shows the status and notifications about the running programs, clock and other icons etc.

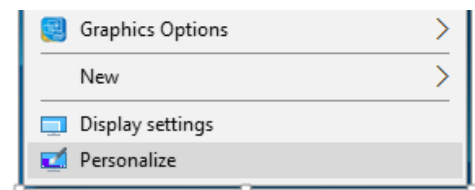


Desktop Background

It is an image that appears at the back of your screen. Most computers come with a pre-selected background, but you can change it to any image you want.

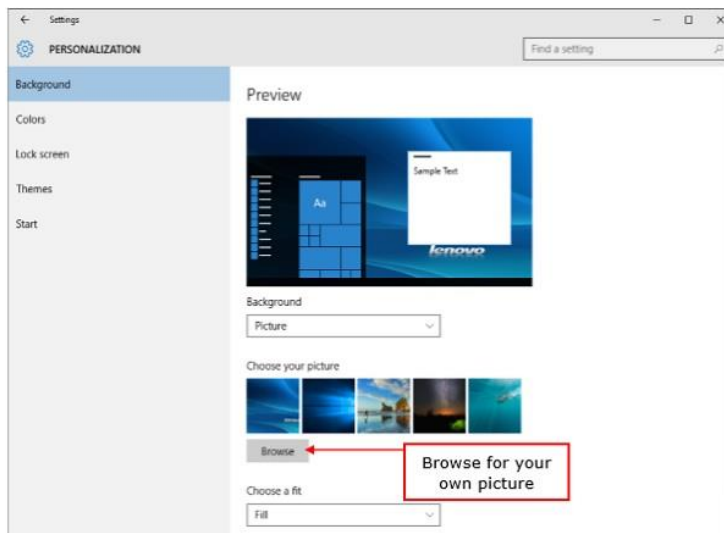
To change the background, follow these steps

Step 1 – Right click on the desktop and choose “Personalize”.



Step 2 – From the Personalization window, choose from the available pictures or browse for your own.

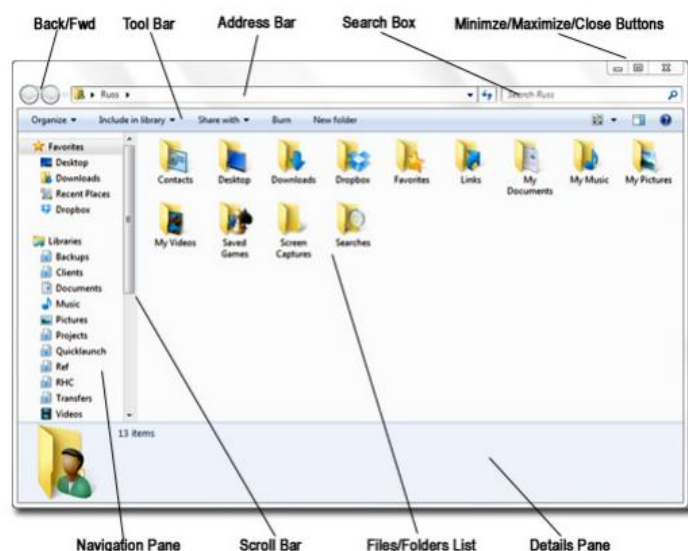
After choosing a picture, the Background will change automatically.



You can make system settings by right clicking on the desktop and choose “Display Settings”. The options like Power & Sleep for setting the time limits for sleep mode and to turn off the screen and the option Storage can be used to see the capacities of each drive in hard disk and to assign the default locations for saving different types of files.

File Explorer or Windows explorer

- The Navigation Pane provides quick links to various folders and locations on your computer.
- The Title Bar contains no text although it still provides the method for moving the folder.
- My Documents contains most of your user documents and files (except for music, pictures and videos).
- The Address Bar has a bread crumb menu. Clicking on any of the listed items Clicking behind the address transforms it into the complete path like *C:\Users\Admin\Desktop\AEES Computer Education - Home Desktop*
- Clicking on Pictures would take you back to the Pictures folder.



- Clicking on Russ would take you to the folder shown in the diagram above.

Files and Folders

Folder (or directory) – a virtual storage space used to store and organize computer files.

- A folder can also contain additional folders (subfolder – a folder within another folder).
- A folder has a name and is represented by an icon.

File – a storage unit on a computer that stores information or data (such as a document, an image, etc.).

- Folders contain files.
- Files are represented by names and icons.

Filename –A file name is used to identify the file uniquely. It can contain letters, symbols, numbers, spaces, etc. The extension of the file associates the type of the file. For example the file name hoviya.docx has the extension as docx which is a word document.

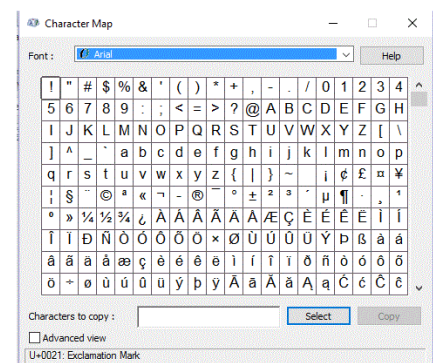
Windows accessories

Accessing accessories: click the start menu then choose all apps, then navigate alphabetically to Windows Accessories as shown in the picture.

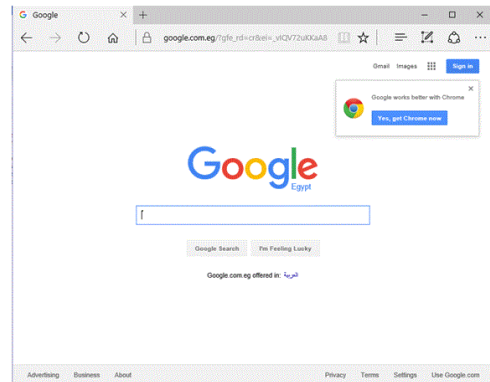


Windows accessories have the following programs inside it:

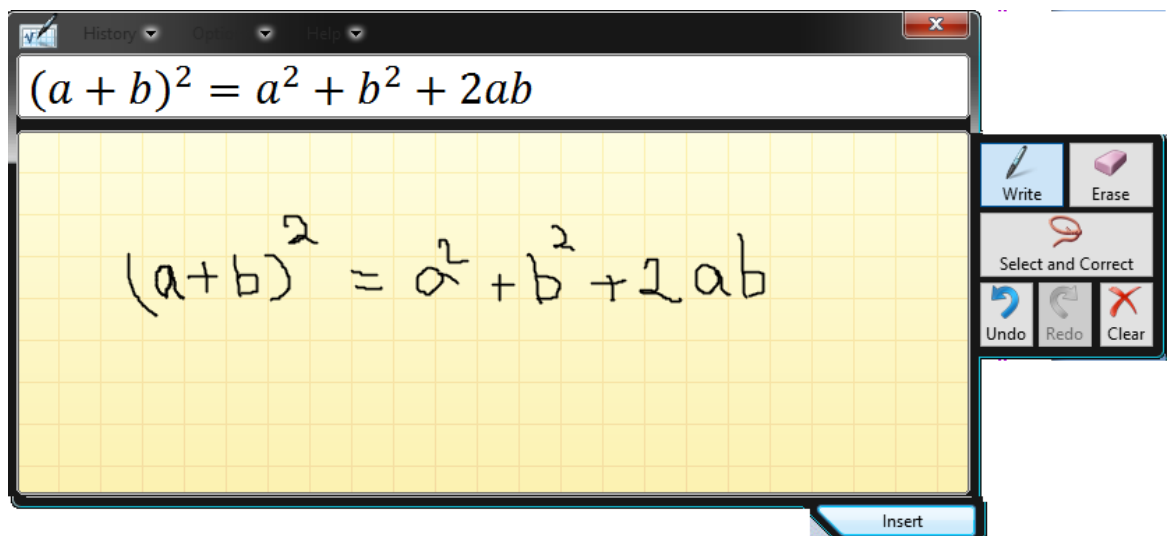
- 1- Character Map:** list of all possible special characters with different font styles to assist you in typing. For example mathematical formulas, smiles and emoji's you will not find on your keyboard.



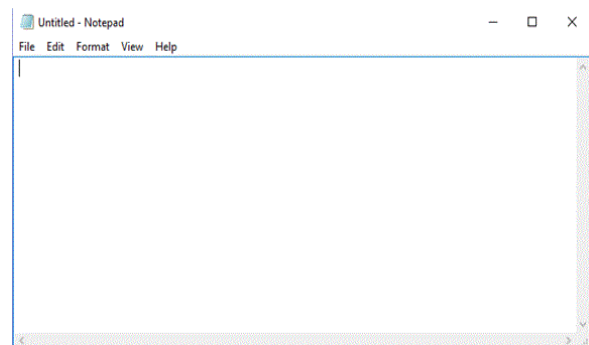
2- Internet Explorer: the well-known Microsoft built in web browser used to surf the internet, which is replaced now by Microsoft Edge.



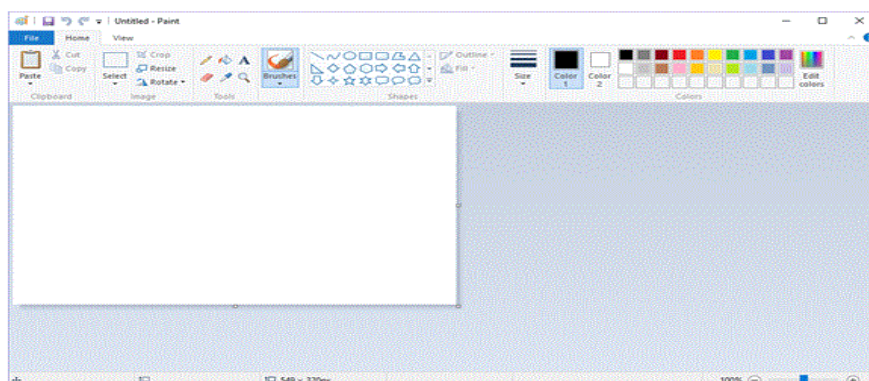
3- Mathematical input panel: a new feature with Windows 10 that allows you to manually input mathematical formula using free handwriting, instead of spending time searching for symbols in character map.



4- Notepad: the world's most famous text editor comes in a very handy interface when it comes to text editing.

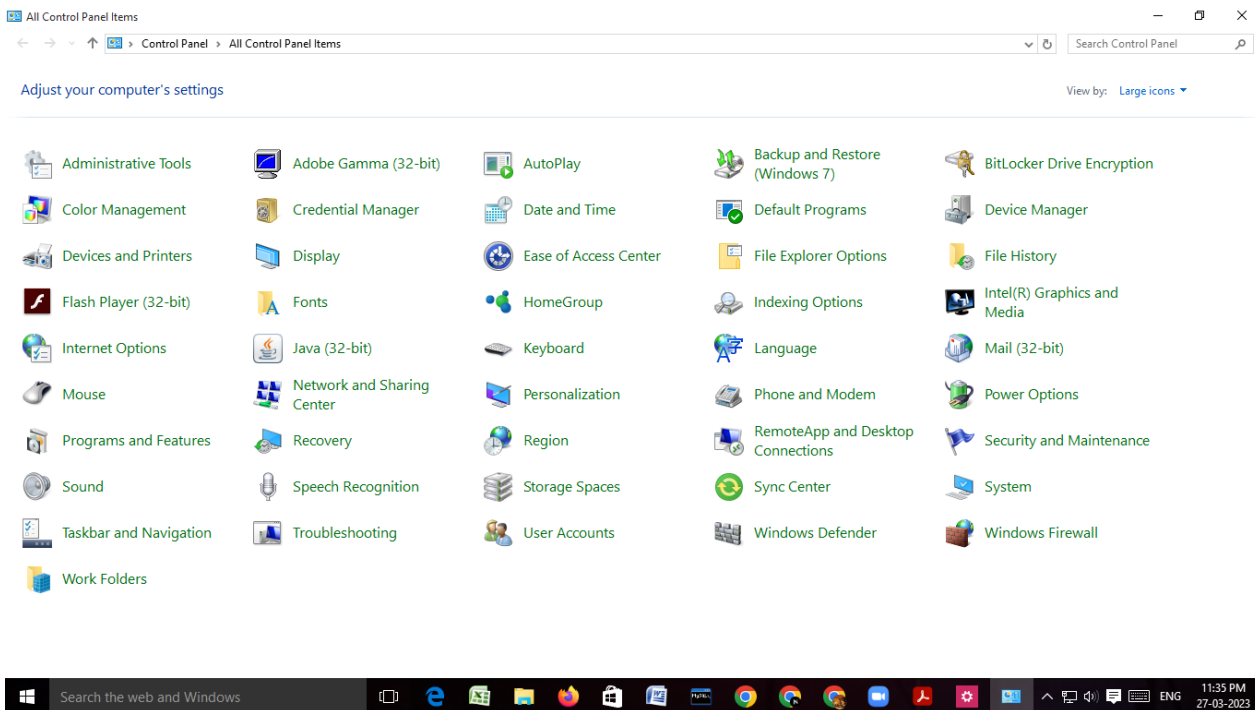


5- Paint: the well-known Microsoft Paint, a simple editor for pictures.



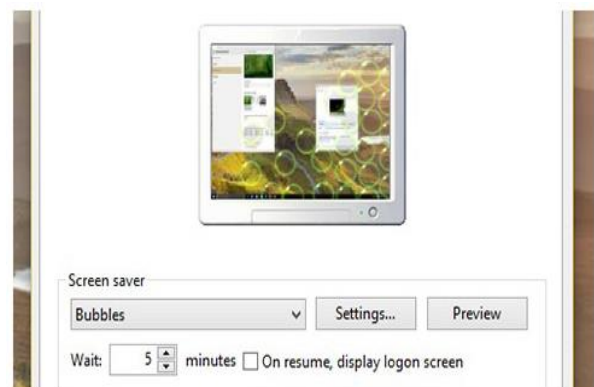
Control panel

To start Control panel in Windows 10, click the Start button or press the Windows key, type “Control Panel” in the search box in the Start menu, and press Enter. Windows will search for and open the Control Panel application. You can also select the control panel by pressing Start Button → Right click → Choose the Control panel. It shows the various utilities available under control panel to change the settings for Windows 10. We can customize the features of hardware and software available in the computer.



Desktop Screen Saver

A screen saver program in windows helps to set a text message or image when the computer goes to idle state after a period of user inactivity. It also helps to prevent the computer by setting password for screen saver while the user goes away for a short period. The steps to be followed for changing the screen saver is as follows



Click on Start Button → Settings → Personalization → Lock screen, and select Screen saver settings. In the Screen Saver Settings window, choose a screen saver from the drop-down list.

EXERCISE

A. Multiple Choice Questions

1. A/An _____ is the small picture that is used to open a program.
a. Taskbar b. Icon c. View d. Windows
1. Which of the following is not an operating system?
a. UNIX b. Windows 10 c. WordPad d. Android
2. Windows is developed by _____ Corporation.
a. Pentium b. Microsoft c. Parle d. IBM
3. _____ is the process of loading an operating system into the computer's memory.
a. Starting b. Booting c. Executing d. log in
4. You can change the position of the _____.
a. Start Button b. Taskbar c. Title Bar d. None
5. An operating system is a
a. hardware b. software c. firmware c. All of these
6. Who is the founder of Android operating system?
a. Andrew E. Rubin b. Steve Jobs c. Bill Gates d. Sundar
7. Which of the following is used to see the shared files or devices of the different computers on the network?
a. Network b. Recycle Bin c. Computer d. this PC
8. _____ is a browser to work with websites
a. Internet explorer b. Windows c. Python d. Basic

B. Fill in the blanks

Start Button / Note pad / Manager / Auto Arrange Icons/Taskbar

1. Operating system is the overall _____ of the computer system.
2. Computer can arrange the icons itself if the _____ option is selected.
3. _____ is present on the extreme left of the taskbar.
4. A long horizontal bar at the bottom of the Desktop is called _____
5. _____ is a text editor comes in a very handy interface when it comes to text editing.

C. Answer the following

1. What is Desktop background?

2. What does GUI stand for?

3. What are icons?

4. What is an operating system?

5. Define a file?

6. What is the use of Recycle Bin?

7. Name any four important utilities in Control Panel.

CHAPTER 2

History of Computer

Introduction

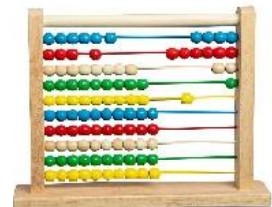
The ancient people used various methods for counting like stones, pebbles, sticks, fingers, toes etc. These methods are not suitable for the complex and bigger problems, hence the need for advanced machines arise in computations. The computers we use today are very advanced and much different from the early devices that were invented for doing calculations.

Let us learn about some of the early calculating devices.

Early Calculating Devices

Abacus

The Chinese invented a calculating machine called Abacus for simple calculations like addition and subtraction about 5000 years ago. The old Abacus used stones but nowadays it made up of strings and beads.



Napier's bones



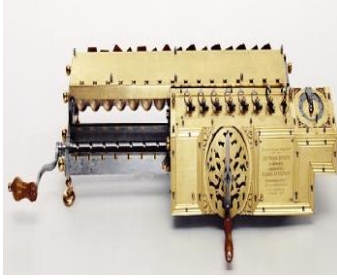
In 1617, John Napier, a Scottish mathematician invented a calculating device called Napier's bones. It has got rectangular rods written with numbers. It can perform addition, subtraction and multiplication. The upgraded version was capable of doing division and square root.

Pascal's Adding Machine (Pascaline)

In 1642, Blaise Pascal, a French mathematician invented the Pascal's Adding Machine. It was having moveable gears with a box for addition, subtraction, multiplication and division. Pascal invented this machine at the age of 18, to assist his father in calculations for the tax collected. The same concept is still being used in odometer, speedometer etc.



Leibniz Calculator



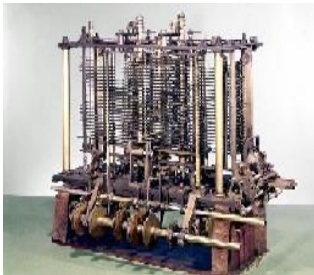
Gottfried Leibniz, a German Mathematician invented the calculating device Leibniz Calculator. It performed arithmetic calculations like addition, subtraction, multiplication and division. It was made up of a stepped drum connected to a counting wheel and teeth.

Charles Babbage's Difference Engine

In 1822, Charles Babbage, mathematics professor of Cambridge University, England, designed a machine called Difference Engine which could do calculations automatically. It was operated manually.



Analytical Engine



In 1833, Charles Babbage dropped the development of difference engine and started creating a modern machine called Analytical Engine. The analytical engine had an input, output and processing system as in modern computers. **Therefore, Charles Babbage is called as the father of the computer.**

Electronic computing devices

ENIAC (Electronic Numerical Integrator and Computer)

John W. Mauchly and J. Presper Eckert invented the first electronic digital computer ENIAC during the year 1946. It was a gigantic size with 100 feet long, 10 feet wide, occupied 1800 square feet and consumed about 1,80,000 watts of electrical power. It was capable of performing 5000 additions per second.








UNIVAC 1 (UNIVersal Automatic Computer)

In 1951, the developers of ENIAC had developed another computer called UNIVAC-1 and that was the first general-purpose electronic computer which could handle both numeric and textual information.

Generation of Computers

The generation of computers means the advancement and growth of technology in certain period of time. It can also be defined as “the evolution of computers to the current stage”. The growth of computers in five different phases are denoted as five generations of computer based on the period, speed, size and computing element.

Generation	Period	Component	Characteristics	Example
First	1946-58	Vacuum tubes 	Huge in size, small memory, slow speed. High power consumption. Use of machine language.	ENIAC UNIVAC 1
Second	1959-64	Transistors 	Small in size, fast and cheap. More storage capacity and more powerful operating system. Assembly language programming.	IBM 1401 RAMAC
Third	1965-71	Integrated Circuits (ICs) Semiconductor chips uses LSI technology (Large Scale Integrated) 	Small in size, less power consumption. Billions of instructions in a few seconds. Increased storage capacity. Less heat generation Used Computer languages COBOL and FORTRAN	IBM 360 series ICL 1900
Fourth	1971-Present	Microprocessors Uses VLSI technology (Very Large	Greater computing power. Large storage capacity. Unique storage devices	IBM - PC Intel 4004 IBM 370

		Scale Integrated) 	at less cost Programming languages C, C++, Java etc.	
Fifth	Present-Beyond	Artificial Intelligence, Nanotechnology 	Very high speed, huge storage capacity. Voice recognition. Large memory requirements. More user-friendly	Super computer Robot

Classification of Computers

Computers perform different types of tasks depending upon its ability, speed and size. Computers can be classified based on the size, purpose, working principle etc.,

Classification of computers according to the purpose

There are three types of computers based on the computational method or purpose. They are

1. Analog Computer

It works on the principle of continuous values such as voltages, pressure, distance, position etc. Some of the examples for analog computers are thermometer, voltmeter, speedometer, scale machine etc.



Thermometer



Speedometer



Scale machine

2. Digital Computer

These computers operate on discrete data. It represents data using binary numbers such as 0 and 1. Some of the examples for digital computers are micro-computer, desktop, laptop, calculator, mobile phone etc.

3. Hybrid Computer

The computer that has the features of both analog and digital computers are termed as Hybrid computers. It is a cost effective method to perform the complex tasks. Some of the examples are Electrocardiogram (ECG) Machine, Ultra Sound Machine, Nuclear security systems, control system for flights etc.



Classification of computer based on its size

There are four classifications based the size and power of the computers. They are as follows

- Micro Computer
- Mini Computer
- Mainframe Computer
- Super Computer

Micro Computer

Micro Computers are the smallest, most affordable and most reliable. Micro Computer is a computer that has a microprocessor chip as its CPU. It is also called as Personal Computer. It includes (i) Portable computers and (ii) Desktop computers.

(i) Portable Computer

Portable computer is a very small, easy to use microcomputer. It can be carried easily from one place to another. It includes personal digital assistant (PDA), note book computer and laptop.

(ii) Personal Computer or Desktop Computer

The Personal computer is a microprocessor based, single user computer. It can be placed easily on the desk hence it is called as desktop computer.



Mini Computer

It is a multiuser computer that comes with lesser memory and storage. It is also called as workstations. A Minicomputer is a medium sized computer developed in 1960s. It is mostly used in universities, colleges and industries.



Mainframe Computer

A mainframe computer is a large, powerful computer that handles the processing for many users simultaneously. The mainframe computers have large storage capacities, very high speed of processing. They are kept in air-conditioned environment.

Applications: They are used by big companies, banks, government departments, etc.,

Mainframe Computer



Supercomputer

It is the largest, fastest and most expensive computer. The storage capacity and computing speeds are much higher than any other computer. It can perform hundreds of millions of instructions per second.

Applications: These computers are used in military simulation, engineering, weather forecasting, medicine and nuclear energy research etc.

EXERCISE

A. Multiple Choice Questions

- Who invented Abacus?
a. Chinese b. India c. USA d. Japan
- Who invented Difference Engine?
a. John Napier b. Gottfried Leibniz
c. Charles Babbage d. Blaise Pascal
- What is the full form of ENIAC?
a. Electronic Numerical Integrator and Calculator
b. Electronic Numerical Integrator and Computer
c. Electric Numerator Integrated Accounting Computer
d. Electric Number Integrated Accounting Calculator
- What was the component used in second generation computer?
a. Vacuum Tubes b. IC c. Transistors d. VLSI
- Which of the following is an example for analog computer?
a. Desktop b. Speedometer c. Smart Phone d. Laptop
- Which of the given computers is handy and it can be operated with the touch of the fingers?
a. Tablets b. LAN c. Mainframe d. Desktop

B. Fill in the blanks

Super Computer / 1833 / Digital / Charles Babbage/IBM 360

- _____ is called as father of computers.
- Analytical Engine was invented in the year _____.
- _____ is an example for third generation of computers.
- _____ computers operate on discrete data.
- The largest, fastest and most expensive computer is _____

C. Answer the following

- What do you mean by Difference Engine?

2. Write a short note on ENIAC?

3. Name the components used in first four generations?

4. Differentiate between analog and digital computers?

5. What are the classifications of computers based on its size?

6. What do you mean by desktop computers?

7. What are the applications of super computers?

CHPATER 3

Multimedia

Introduction

Multimedia is a method of communication, to present the information in an attractive manner using text, graphics, images, audio, animations or video in an integrated manner.

Multimedia plays an important role in the presentation. It can be used in a variety of applications such as entertainment, advertisement, education etc. The evolution of internet has also increased the demand for multimedia content.



Definition of Multimedia

Multimedia is the way to represent computer information in an attractive manner using text, audio, graphics, animation, video etc. It also refers to the use of electronic media to store and experience the multimedia content.

Multimedia System

The computer system capable of processing, storing and manipulation of multimedia content using multimedia components and applications are termed as multimedia systems

Components of Multimedia Systems

In order to present the content in an attractive and interactive manner, the following components may be used.

a. Monitor

Colour monitor with high resolutions help to present the content in a better way. It is also preferred to use 19” or higher size monitors for animations, images, video or presentations.

b. CD-ROM/DVD Drive

It is used to store/play the contents on the computer and it is common that multimedia contents occupy more storage space because of various components of multimedia are included.

c. Speakers and Sound Card

The sound and audio effects can be heard through speakers and the sound card is necessary to recognize the speakers connected through the ports.

d. Microphone and Headphone

A microphone is a small device used to record sound or voice into the computer. The headphones are used to hear the sound, voice, songs etc. A headphone with microphone is used to record as well as hear the sound.

e. Joystick

It is an input device, used to play games on a computer. It has got one or more push buttons to control the operations of the game or software and it can also be read by the computer.

The various components of multimedia are Text, Audio, Graphics, Video and Animation. All these components work together to represent information in an effective and easy manner.

Applications of Multimedia

Multimedia is an amazing modern technology for the entertainment and learning. It provides enormous advantages in various fields of communication, advertisement, Medicare etc. Some of the applications are given below

- ❖ **In the field of Education**, it has brought a tremendous change to supplement the teachers and students. The various multimedia software help to learn the subject in the self-paced manner sitting at home.
- ❖ **Entertainment:** Multimedia has witnessed tremendous growth in the field of entertainment like TV, Social websites (YouTube, Facebook etc.), Movies etc.
- ❖ **Marketing:** It helps to create advertisements to promote the sales in marketing
- ❖ **Communication:** It is possible to have video conference, conference call and live video streaming etc.
- ❖ **Mass Media** - It is used by the journalists for preparing magazines and newspapers.

- ❖ **Gaming Industry** - Video Gaming is an exciting application of multimedia.
- ❖ **Medical field** - Multimedia is also used by the surgeons as they can use images created from imaging scans of human body to practice complicated procedures such as brain removal and reconstructive surgery.
- ❖ **Engineering** - Software engineers often use multimedia in simulations.

Multimedia Software

- ❖ Word processing tools like Microsoft Word, Presentation software like MS-PowerPoint and MS-Paint etc.
- ❖ Graphic and Image Editing Tools like CorelDraw, Photoshop
- ❖ Sound Editing Tools like Sound recorder from Microsoft, Apple's QuickTime Player pro, Sonic Foundry's Sound Forge for Windows, Sound edit, Audacity
- ❖ OCR Software
- ❖ 3-D Modelling and Animation Tools, Painting and Drawing Tools like Freehand, Designer and Canvas.

Popular Software Tools for Multimedia

We can create, edit or run a multimedia content using the specialized software like Windows Media Player, digital audio editors and VLC Media Players etc. Let us discuss the working procedure of Windows Media Player.

Windows Media Player

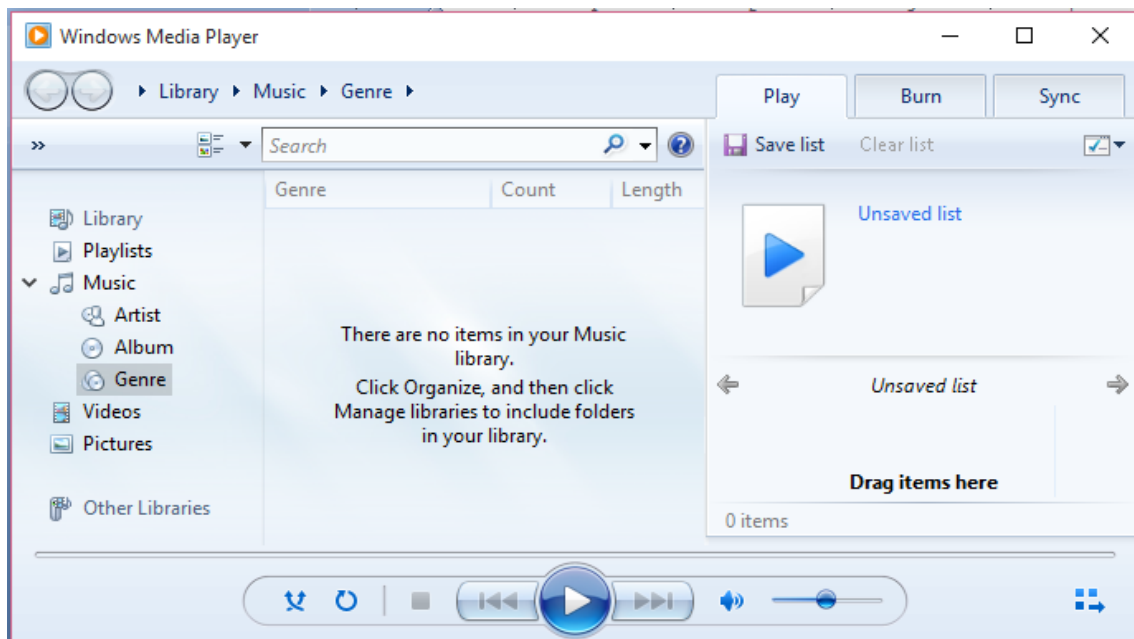
The Windows Media Player (WMP) is a tool (Software) that is used for viewing photos, play music, and watch video. It comes with Windows Operating Systems for free. It supports most of the image, audio and video file formats like MPEG (Moving Picture Experts Group), MP3(MPEG Audio Layer 3), MP4(MPEG Layer 4), WMA(Windows Media Audio), WMF(Windows Meta File), WAV (Waveform Audio file format) AVI (Audio Video Interleave), DAT(Digital Audio Tape) etc.

It can play a song or Video files directly from CD or the hard disk. The steps to be followed to play the relevant file in WMP are as follows.

Step 1: Type “Windows Media Player” in the Search box and then double click on Windows Media Player.

Step 2: Alternatively it can also be started by right clicking on Start→ Run→ type “wmplayer.exe” and click on OK

Step 3: Third method of opening Windows Media Player is to click on Start→All Apps→Windows Accessories→Windows Media Player. It displays the following screen.



Step 4: The library at the left side displays the different categories of files like Music, Videos and Pictures. Select a category so that the details pane at the right side displays all the files available in that category.

Step 5: Double click on any file to begin playing it. The seek slide can be used to move forward or backward.

Computer Games

The multimedia computers support for various computer games. Students can develop cognitive skills by playing the games. Some of the games for cognitive skill developments are CogniFit-Brain Training, FunExpected Math, Brain Kids, Solitaire, Chess, Knight Riders, Free Cell, Minesweeper, Pinball, Road Rash etc.

EXERCISE

a. Name the following using the given hints

**Sound Card / Windows Media Player / Multimedia System /
Microphone / TV Tuner Card**

1. The computer system capable of processing, storing and manipulation of multimedia content.
2. An input device to record your voice.
3. The piece of hardware to which the loudspeakers or headphone must be connected.
4. The piece of hardware you will need to see television programs on your computer`s monitor.
5. The Windows software to play back sound.

b. Fill in the blanks

1. Multimedia is a combination of _____
a. Graphics, colours, sounds and animation b. 1's and 0's
b. Input, process and output d. Bits and bytes
2. Multimedia can be used in
a. Schools b. Advertising c. Training d. All of these
3. In which of the following movies, multimedia's special effect is used?
a. Avatar b. Jurassic park c. Lion king d. All of these
4. Which of the following is an input device mainly used for gaming?
a. Keyboard b. Mouse c. Joystick d. Microphone
5. Which of the following is the popular graphic and image editing tool?
a. MS-Word b. MS-Paint c. Photoshop d. PowerPoint

c. Answer the following

1. Define - Multimedia.

2. Write down any 4 fields where Multimedia is used?

3. Write a short note on Windows Media Player?

4. Write down the Hardware requirements of Multimedia.

5. Write down the Software requirements of Multimedia.

6. Write the full form of the following.

MPEG : _____

MP3 : _____

MP4 : _____

WMF : _____

AVI : _____

CHAPTER 4

Internet

Introduction to Internet

Hello my dear students!

Shall we go to the virtual world? Have you seen the film Avatar 2 (The Water World)? Do you know that such a place does not exist on Earth? It is fully the product of the director James Cameron's imagination. We can see many things on the Internet, but they are not available on our computer because they are present on different web servers. Yes, the web content looks like virtual on our computer. The Internet allows you to connect to the world through computers.

Internet is also called as Net. In simple words, internet is a gigantic collection of interconnected computers to share the information. It connects millions of computers across the world.

History of Internet

In 1969, the first network, ARPANET (Advanced Research Projects Agency Network), was created by the Department of Defence, USA, for the exchange of information in the military. Later, it was used to connect computers at different universities, and then it was demonstrated to the general public.

The modern internet was developed by Bob Kahn and Vint Cerf in the year 1970 as a result of ARPANET project.

In the year 1989, Tim Berners Lee invented World Wide Web (WWW) technology for the internet. By the end of 1990, the concept of Web page was introduced. He also wrote the first version of HTML in 1993. In April 1993, the World Wide Web technology was available for the public use on a royalty-free basis. In 1995 the first connection was established over what is today known as the Internet. Since then, the Web has changed the world. It is the most powerful communication medium the world has ever known.

Uses of Internet

Internet connects millions of computers, people and websites. It has got enormous applications in day to day life. Some of them are listed here.

- ❖ Send/Receive e-mail messages
- ❖ Exchange of files between computers
- ❖ Online education
- ❖ Participate in groups discussions
- ❖ Browsing the web
- ❖ Online Chat
- ❖ Video-conferencing
- ❖ E-Commerce
- ❖ Social Networking
- ❖ Entertainments
- ❖ Gaming

Requirements for using Internet

In order to work with Internet, we need to have the following hardware/software

- ❖ A computer/laptop or other devices like tablet, smart phone etc.
- ❖ A telephone line or the cable connection that provides net connection.
- ❖ A modem – It stands for modulator or demodulator. It helps to connect to the internet over the telephone lines/cables.
- ❖ An internet connection – It is provided by various companies called as Internet Service Provider (ISP). Some of the service providers are BSNL, Jio, Airtel, Tata, Vodafone etc.
- ❖ Web browser – A software used to browse the web pages. The popular web browsers are Google Chrome, Mozilla Firefox, Microsoft Edge etc.

Internet Terminologies

World Wide Web

The World Wide Web (WWW) is an internet based service for accessing information over the medium of the internet using a common set of rules known as protocols. It can also be defined as the world-wide collection of electronic documents.

Web browsers

A web browser is software that is useful for accessing websites through the internet. The information is transferred using http protocol. Some of the popular web browsers are as follows Chrome, Opera, edge etc



Web page

An HTML document or page available on the Internet is called a web page. It generally contains text, graphics, images, and video.

Website

A website is a collection of web pages for a particular purpose. The first page of the website is called the home page, which provides links to various other pages. Website is owned and updated by an individual, company, or an organization eg. www.aees.gov.in, www.cbse.gov.in

Uniform Resource Locator (URL)

It is an address for the resource available on the internet. It is simply the web address that informs the web browser to search for the web content and display it.

Search Engines

A search engine is software used to extract information from the internet based on keywords or topics. Some of the search engines are Google, Bing, Webcrawler, Ask, Yahoo!, MyWebSearch, Info.com, etc.



Net (web) surfing

Exploring the web is known as web surfing or browsing, which is moving from page to page on the Web. We can navigate through the links provided on the web pages.

Steps to visit any website

Double-click on the web browser on the desktop to open it. The opening of the website can also be done in the following ways:

- ❖ Click on Start button
- ❖ Click on All programs

- ❖ Click on a web browser such as Internet Explorer, Google Chrome etc.
- ❖ Type the website address in the address bar or if you don't know the website address find it using the search engine.
- ❖ For example, type the website address <https://cbseacademic.nic.in//index.html> in the address bar.
 - Press Enter key on the keyboard.
 - The website opens as shown below,



Then you can open the different web links available in the website to get the desired information.

Exploring the Websites - AEES website

Atomic Energy Education Society website provides information about the AEES schools. To open AEES website type website address www.aees.gov.in in the address bar of the web browser. The website opens as shown below

Candidates can login now to view their CBT Re



Click on the different tabs to get more details. Similarly you can open different website and explore the information.

Example:

- <https://ncert.nic.in>
- <https://www.education.gov.in>
- <https://www.navodaya.gov.in>
- <https://kvsangathan.nic.in>
- <https://www.wikipedia.org>

Open your school website and explore all the pages.

EXERCISE

1. Fill in the blanks.

1. ARPANET stands for _____
2. Network of Networks is called _____
3. _____ is a collection of webpages.
4. The full form of URL is _____
5. WWW Stand for _____
6. The World Wide Web was invented by _____
7. A _____ is a software that is useful for accessing websites through the internet.
8. The full form of ISP is _____

9. Exploring web is known as _____
10. WWW uses common set of rules known as _____

2. State whether the following statements are true or false.

1. Google is an operating system. (True / False)
2. Internet is a software. (True / False)
3. Web server contains the websites.(True / False)
4. Internet Explorer is a web browser.(True / False)
5. Windows is also a web browser.(True / False)

3. Answer the following

1. Mention a few uses of Internet.

2. What are the devices used for the Internet connection?

3. Define World Wide Web.

4. What is Uniform Resource Locator?

5. What is Net Surfing?

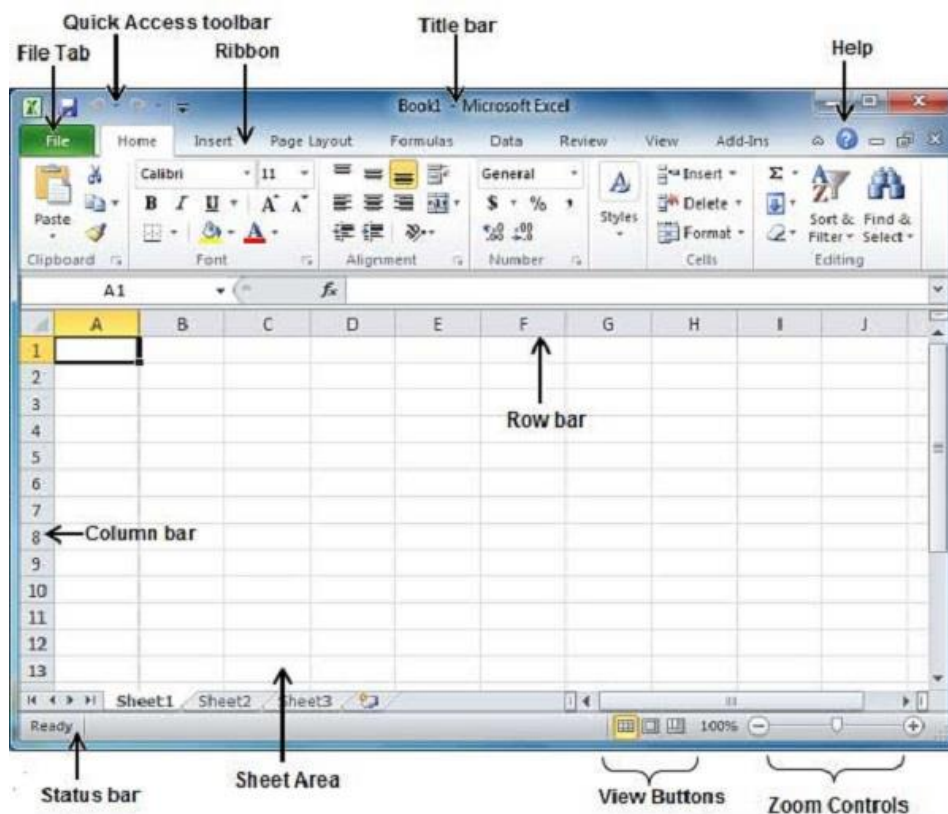
CHAPTER 5

Excel Spreadsheet – Part-1

Introduction

Microsoft Excel is a spreadsheet application mainly used to deal with data. It allows organizing data in the form of rows and columns for data manipulations, calculations, reports, charts, graphs, etc. MS-Word and MS-Excel have a lot of common features as they are components of Microsoft Office. As you are familiar with MS-Word, you can use several common features of MS-Excel easily.

You can save the Excel file with .xls or .xlsx extension.



Starting MS Excel

MS Excel can be opened by double clicking on the Excel icon from the desktop or task bar. Alternatively, select by clicking Start→All Programs > Microsoft Office > Microsoft Excel, and then a new empty workbook will be displayed on your screen. If you double-click on an existing Excel file, it opens the Excel and displays the selected file on your screen.

Closing MS-Excel

Excel can be closed by clicking the button X on the right side of the title bar or by selecting File > Exit. If you have unsaved data, you will be prompted to save the changes before exiting.

Benefits of Excel

MS Excel is widely used to store, analyse, and prepare reports on large amounts of data. Excel is mainly used for calculations, accounting, financial analysis, graphs, charts, etc. Some of the benefits of using Excel are outlined below.

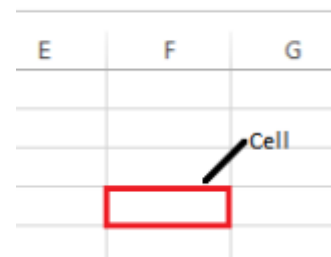
- ❖ Easy to manage data like storing, retrieving, recovering etc.
- ❖ Data can be organized at one place
- ❖ Supports for mathematical and other functions to simplify calculations
- ❖ Presentation of data in the form of tables, charts, diagrams etc for easy understanding
- ❖ Quick analysis of data using pivot tables
- ❖ Data can be secured using various protection mechanisms

Basics of Excel

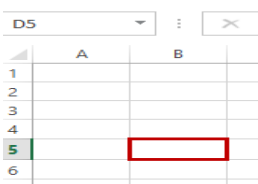
A workbook is a spreadsheet file that can contain up to 256 worksheets, and each worksheet can have a maximum of 16384 columns and 1048676 rows.

What is a cell?

A rectangular box at the intersection of rows and columns is called a cell. It is a basic unit in which data can be entered. The maximum width of the cell is 255 characters, and it can store up to 32767 characters. The current cell that has focus is called an active cell, and it is identified by the dark border as given in the picture.



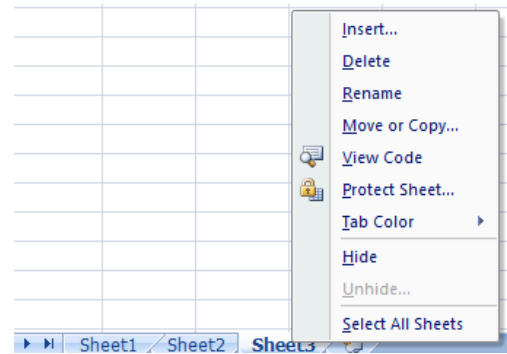
What is Cell Address?



A cell address is identified by the column label and the row number. For example, the cell address D5 is determined by row 5 and column D.

Workbook

A workbook is a collection of worksheets. When a new Excel file is created, a new workbook opens with three default worksheets named Sheet1, Sheet2 and Sheet3. Worksheets can be inserted, renamed, copied, deleted, or protected by choosing the option when right-clicking the sheets.

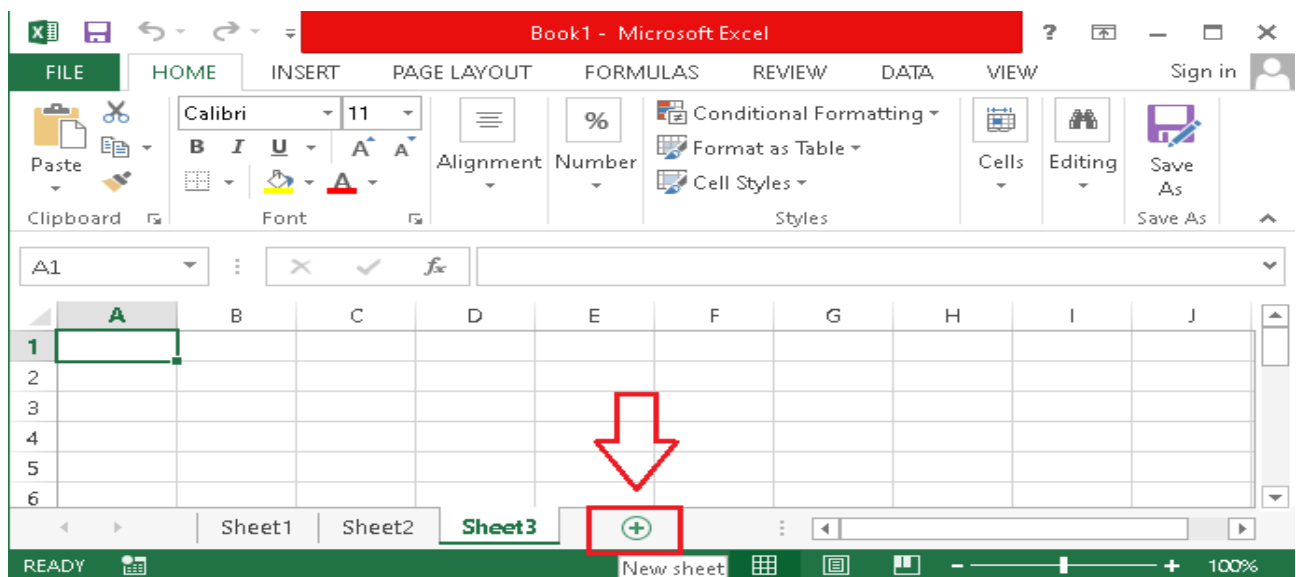


Worksheet

A worksheet or sheet is a collection of cells in the form of rows and columns. Worksheets are used to store, manipulate, and display data.

Features of Excel

The various features of MS Excel are given in the form of menus and options.



Home

It contains the options for editing contents, formatting options like font size, font styles, font colour, background colour, alignment, insertion and deletion of cells, sorting, filtering etc.

Insert

This menu helps to insert images, charts, shapes, clipart, math equations, header, footer and symbols etc.

Page Layout

Themes, orientation and page setup options are available under the page layout option.

Formulas

Since MS Excel helps create worksheets with large amounts of data, the Formulas option helps include formulas to get quicker solutions.

View

The display of the worksheet on the screen can be changed using the different view options available in this menu. It also provides zoom options to increase or decrease the zoom level of the document. You can use the zoom controls available on the status bar to quickly zoom the document.

Data types

Microsoft Excel supports various types of data to be keyed into the cells. The user can choose the type of data depending on the requirements. Some of the commonly used data types are given below.

Number: It consists of digits that could be used to represent integers, prices, percentages, and other numeric formats. Some of the number formats include commas, decimal points, currency symbols, etc. *If you want to treat a number as text, then you should precede the number with a single quotation mark (').*

Text: It represents alpha-numeric information that includes names, places, descriptions, sentences, headings, etc.

Dates and Times: It represents data in the form of date, time or both. Calculations can be performed on date format to find the age, number of days between two dates, etc.

Logical: It represents the Boolean values either TRUE or FALSE.

Error: It occurs when Excel recognizes the data entered or calculated is wrong. It is identified by the symbol # at the beginning of the value like #Name?, #Ref!, #Num!, etc.

Working with Data in Excel

Entering Data in Spreadsheet

The following method is used to enter the data in a cell

- ❖ Select the cell by clicking the left button on mouse and it becomes the active cell
- ❖ Type the new data.

- ❖ Use TAB key to move to the next column or ENTER key to move to the next row. Press ESC key to cancel the entry in the current cell before leaving the cell.
- ❖ Click on formula bar to make changes in the formula and Press enter.
- ❖ To edit data in a particular cell, double click on the cell to place the insertion point in it and make the necessary changes and press enter.

Note: Date should be entered using / or – sign like 25/08/2003 or 14-11-2004, similarly time can be entered using : sign like 01:34:20

Deleting Data in Spreadsheet

The data in one or more cells can be deleted as follows

- ❖ Select the cell(s) to be deleted
- ❖ Press **Delete** key on the keyboard
- ❖ It deletes only the content not the cells.

Copying Data in Spreadsheet

The data in one or more cells can be copied as follows

- ❖ Select the cell(s) to be copied
- ❖ Right click on the selected cells and select **Copy**
- ❖ Point to the destination cell, right click and choose **Paste**
- ❖ You can also use the keyboard shortcuts Ctrl+C and Ctrl+V for copy and paste operations.

Moving Data in Spreadsheet

The data in one or more cells can be moved as follows

- ❖ Select the cell(s) to be moved
- ❖ Right click on the selected cells and select **Cut**
- ❖ Point to the destination cell, right click and choose **Paste**
- ❖ You can also use the keyboard shortcuts Ctrl+X and Ctrl+V for copy and paste operations.

Saving a Workbook

In order to keep your data permanently on the storage devices, you need to save the file. The steps to be followed to save a file are as follows.

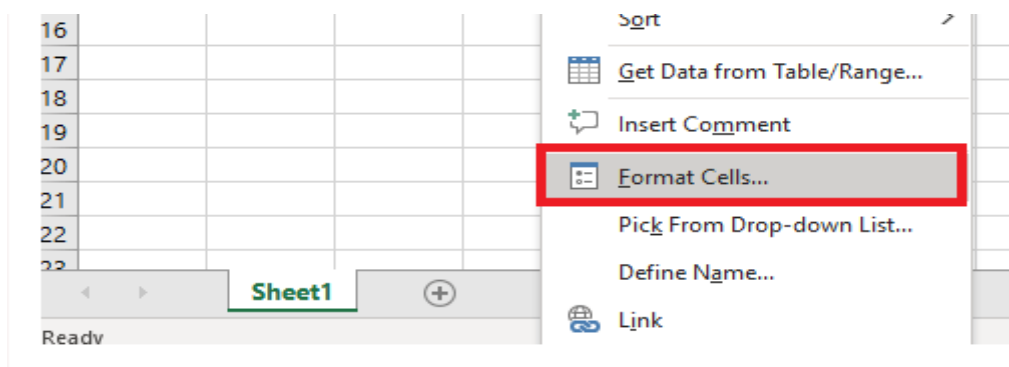
- ❖ Click on File→Save, or click the Save icon
- ❖ If this workbook has been saved before, then the workbook will be saved again with the same name and location.
- ❖ If it's the first time of saving this workbook, then the **Save As** dialogue box will open.
- ❖ Click the drop-down arrow next to **Save In** to select the desired drive and folder.
- ❖ Type the new file name in the File name field.

- ❖ The default file type is Excel Work Book. Excel file can also be saved in different file formats.
- ❖ Click the Save button.
- ❖ The extension for the Excel file will be .xls or .xlsx

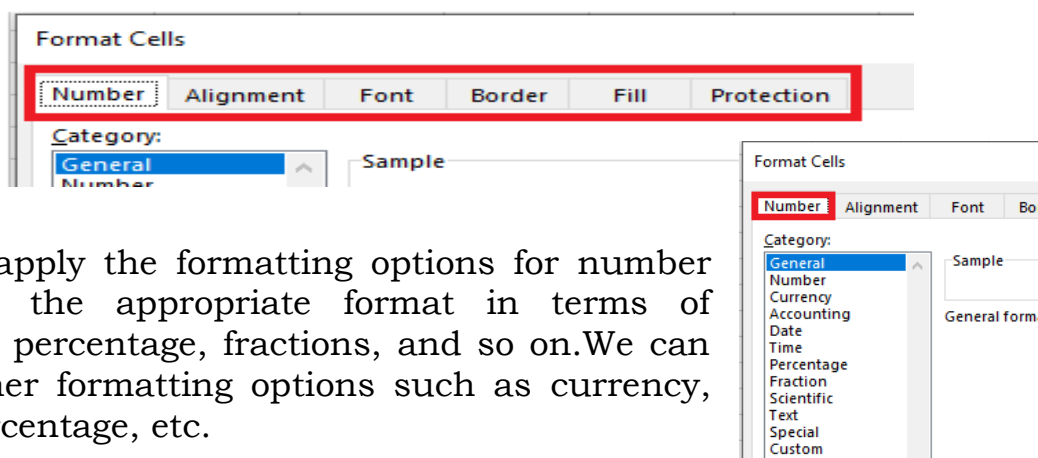
Formatting

The formatting feature of Excel helps to present the worksheet in an attractive manner. It changes the appearance of the data present in the worksheet without modifying the actual data. With the help of the format cells, we can change the number, alignment, font style, border style, fill options, protection, etc.

First, select the range of cells to which you want to apply the formatting feature and right-click on the mouse to access the formatting option. It displays a pop-up menu, and then we have to click on the Format Cells, or we can also use the shortcut key Ctrl+1 on our keyboard.



The below picture shows the various tabs present in the Format Cells dialogue box. Most of the following options can also be accessed from the Home tab of the menu bar.



Number Tab

It is used to apply the formatting options for number cells, offering the appropriate format in terms of number, date, percentage, fractions, and so on. We can also apply other formatting options such as currency, date, time, percentage, etc.

Alignment Tab

The alignment tab can be used to align the data in the cell and merge the text of two cells together. If the text is hidden, we can use the wrap text to display it appropriately, and align the text in the desired direction.

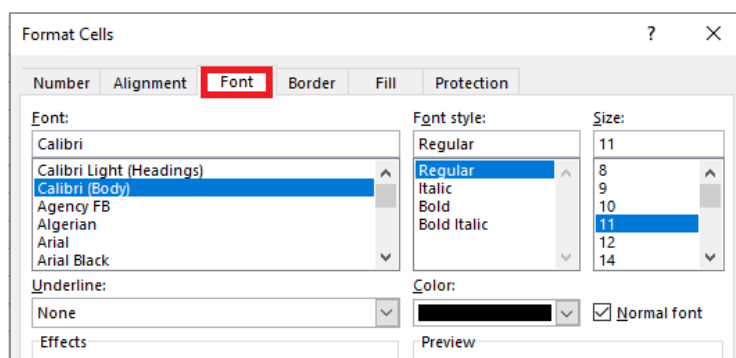


Text Alignment option allows to align the text within the cells both horizontally and vertically.

Font Tab

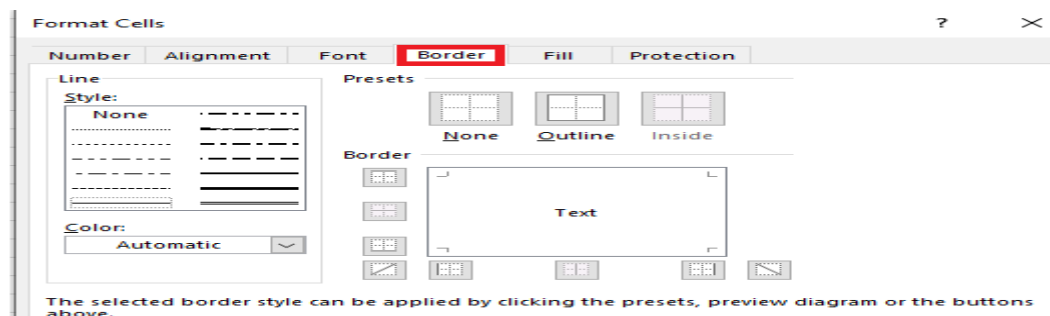
Font Tab helps to alter the font size, font style, font color, etc. We can change the font effects, underline the text, and it can also be previewed.

Quick Font changes can be made from the home tab; however, the Format Cells dialog box is more efficient for mass changes. From there, we can easily modify the typeface, font size, italicize, point size, bold underlining, italicize, and, color across the whole selection of cells.



Border Tab

By using the Border Tab, we can create different colourful border lines for one or more cells; if we don't want to provide the border outline, we can leave it blank. We can choose the thickness, colour, style and the sides of the lines.



EXERCISE

1. Choose the correct answer.

- The address that is obtained by the combination of the Row number and the Column alphabet is called _____.
a. worksheet b. cell c. workbook d. cell address
- Excel workbook is a collection of _____ and _____.
a. worksheet and charts b. graphs and images
c. sheets and images d. video and audio
- _____ is used to display the worksheets attractive and legible manner.
a. Editing b. Formatting c. Polishing d. None of these
- In Excel, by default the sheets tabs colour is,
a. black b. white c. yellow d. Red
- Text, Number, Dates and Times are some _____ of Excel.
a. Functions b. Data types c. Formulas d. None of these

2. State True or False.

- We can apply different colours in the same cell.
- Using MS-Excel we can draw paintings.
- Basic file operations such as creating, deleting, renaming, editing etc. are same for both MS-Word and MS-Excel.
- A worksheet in excel is automatically created whenever we open MS-Excel.
- When we open a new Excel sheet the active cell address is A1.

3. Fill in the blanks

- A workbook can contain a maximum of _____ worksheets.
- _____ data type in Excel sheet represents the values either True or False.
- The maximum width of the cell is _____ characters long.
- _____ in Excel helps to get quicker solutions.
- _____ key is used to move the cursor to next cell in Excel.

4. Answer the following

1. What are the benefits of Excel?

2. What is a cell address?

3. Write about any three data types.

4. What do you mean by formatting?

5. Practice the following on your computer.

1. Create the following worksheet in excel

R.No.	Name of the student	Date of Birth	Class	House	Unique Id
1	KAVIN	12-02-2015	IV-A	RED	1101102
2	HARISH	02-07-2014	IV-B	BLUE	1101201
3	NAVEEN	14-11-2014	IV-C	GREEN	1101301
4	RAJESH	25-08-2015	IV-D	YELLOW	1101401

- Apply the formatting features such as alignment, bold, colour, font etc.
- Try the different formats of date data type for the field Date of Birth.
- Rename the sheet to Students.
- Copy the first row and paste it at 5th row.

- e. Change the data in 5th row.
- f. Using the formatting tab, try various options of Number, Alignment, and Font etc.
- g. Insert 3 rows in between for new students and enter the data
- h. Save your file in a particular folder.
- i. Again open the file, make changes in the data and save the file.

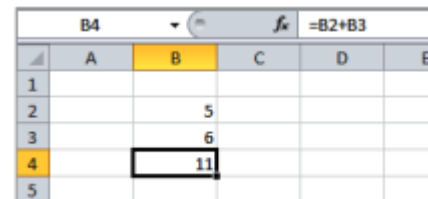
CHAPTER 6

Excel Spreadsheet advance– Part-2

Formulas and functions

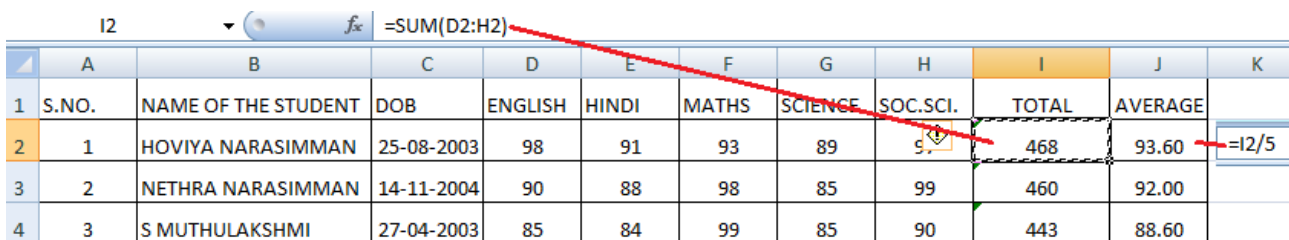
Formulas and functions are the basic building blocks for performing arithmetic calculations in Excel.

A formula is a combination of cell addresses, functions, operators, etc. In Excel, every formula must begin with an equal sign (=).



	A	B	C	D	E
1					
2		5			
3		6			
4		11			
5					

For example, assume that the cell B2 contains the value 5, B3 contains the value 6, and the cell B4 contains the formula =B2+B3 then the result of 11 will be displayed.



	A	B	C	D	E	F	G	H	I	J	K
1	S.NO.	NAME OF THE STUDENT	DOB	ENGLISH	HINDI	MATHS	SCIENCE	SOC.SCI.	TOTAL	AVERAGE	
2	1	HOVIYA NARASIMMAN	25-08-2003	98	91	93	89	9	468	93.60	=I2/5
3	2	NETHRA NARASIMMAN	14-11-2004	90	88	98	85	99	460	92.00	
4	3	S MUTHULAKSHMI	27-04-2003	85	84	99	85	90	443	88.60	

Range

A group of cells in a worksheet is called a cell range. The range of cells are identified by the anchor points like the cell address of top left and bottom right corners separated by colon (:). For example the range of the cells A1:B3 includes the cells A1, B1, A2, B2, A3 and B3.

Operators

A formula contains constants, cell addresses and operators, etc. An operator performs an operation using the operands. Though there are several operators in Excel, the following arithmetic operators are widely used for calculations.

Operator	Purpose
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Percentage
^	Exponentiation (5^2)

Functions

A function is a ready-made formula for the more frequently used mathematical or statistical operations. A function can be used with the formula like **=Function Name (arguments), where arguments can be the address of the cells or a range of cells.** Some of the commonly used functions are given below

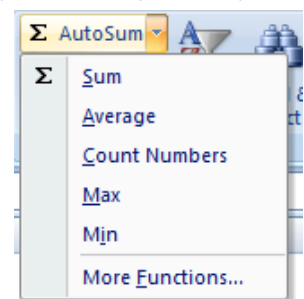
Function	Purpose	Example
SUM	To find the sum of values present in the cells	=sum(a1,a2,a3,a4) =sum(a1:b4)
AVERAGE	To find the average of the values present in the cells	=average(a1,a2,a3) =average(a1:a25)
ROUND	Rounds the given number to the specified number of digits.	=round(a2,1) it rounds to one decimal digit.
MIN	Returns the minimum value in the given range	=min(a1:a25)
MAX	Returns the maximum value in the given range	=max(a1:a25)
COUNT	Returns the count of the text or numbers	=count(a1:a25)

Auto Sum

AutoSum is a function used to calculate the result based on the function selected. For example, if you want to add the values of cells A1 through A5, select the cells A1 through A5 and click the AutoSum button, it creates the formula =SUM(A1:A5) in cell A6 and displays the sum of those numbers.

	A	B	C	D	E	F	G	H	I	J	K
1	S.NO.	NAME OF THE STUDENT	DOB	ENGLISH	HINDI	MATHS	SCIENCE	SOC.SCI.	TOTAL	AVERAGE	
2	1	HOVIYA NARASIMMAN	25-08-2003	98	91	93	89	97	=SUM(D2:H2)	93.60	
3	2	NETHRA NARASIMMAN	14-11-2004	90	88	98	85	99	SUM(number1, [number2], ...)		
4	3	S MUTHULAKSHMI	27-04-2003	85	84	99	85	90	443	88.60	

Note: AutoSum function has several other numerical functions such as Average, Count Numbers, Max, Min etc. The result of the function appears on the next or bottom cell depending upon the direction of the cells selected.



Handling with rows and columns

Inserting row(s) and column(s)

In order to insert the rows or columns, do the following steps

1. Select the row(s) or column(s) on the row number(s) or column label(s)
2. Right click on the selection portion and click on insert
3. The selected number of row(s) or column(s) will be inserted below the row(s) or right of the column(s).

Deleting row(s) and column(s)

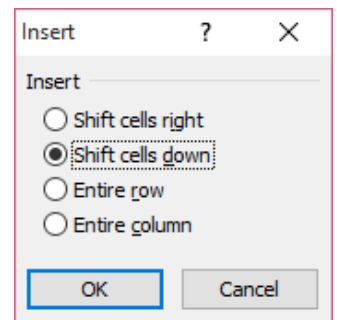
In order to delete the rows or columns, do the following steps

1. Select the row(s) or column(s) on the row number(s) or column label(s)
2. Right click on the selection portion and click on delete
3. The selected number of row(s) or column(s) will be deleted and the row(s) or column(s) will be shifted accordingly.

Steps to insert cell(s)

In order to insert the cell(s), do the following steps

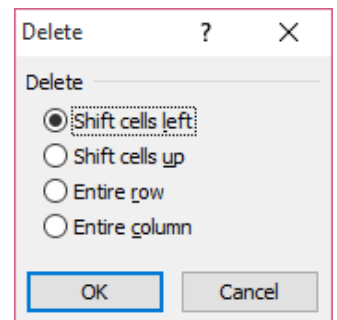
1. Select the cell(s) where the new cell(s) to be inserted
2. Right click on the selection portion and click on insert
3. Now a pop-up dialogue box will appear and Excel will ask you choose the option so that the selected cell(s) will be shifted accordingly.



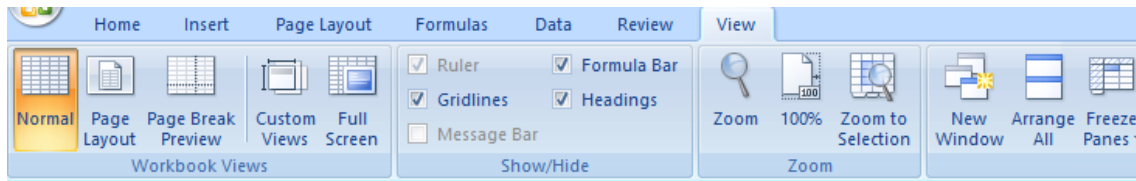
Steps to delete cell(s)

In order to delete the cell(s), do the following steps

1. Select the cell(s) to be deleted
2. Right click on the selection portion and click on delete
3. Now a pop-up dialogue box will appear and Excel will ask you choose the option so that the selected cell(s) will be shifted accordingly.



View Menu



Excel provides various features in View menu for display and print settings of the workbook. It allows creating multiple views without saving each view separately. Some of the important features of View menu are explained below

Normal View: This is the default option in the Workbook Views. It shows data in the form of rows and columns.

Page Break Preview: This view splits the worksheet into printable areas. When you want to print part of the worksheet, you should use this view option.

Page Layout: It displays the worksheet as it will be printed on a paper. It helps to adjust the setting like margin, header, footer etc.

Gridlines

Gridlines are the light grey line that indicates the rows and columns. Selecting the gridlines check box toggles the display of gridlines.

Freeze Panes

Freeze panes option is used to keep one or more rows or columns visible while scrolling. It also allows to freeze first row or column and to scroll the remaining part of the worksheet.

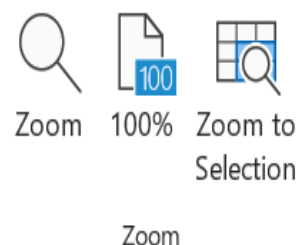
Zoom

Worksheet can be zoomed to a required level so that the better clarity in reading can be achieved.

Zoom - Displays the "Zoom" dialog box and we can choose the % of zooming.

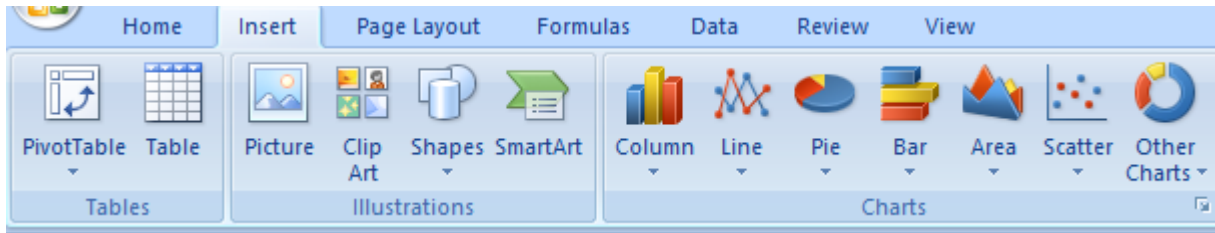
100% - It displays the workbook to 100% of its normal size.

Zoom to Selection –It zoom the worksheet to display just the currently selected cells.



Inserting Images

An image can be inserted to a worksheet using the Insert menu as follows



Steps to Insert Picture in a Cell

- ❖ Click on Insert→Pictures from the Illustrations group.
- ❖ An Insert Picture dialogue box will be opened. Choose the picture to be inserted from your computer
- ❖ A latest version of MS-Excel also supports to insert picture from the online.
- ❖ Click on Insert, then the image will be inserted into the spread sheet.
- ❖ By selecting the inserted image, it can be resized as per the requirement and be placed wherever required.

Inserting Charts

The graphical representation of data gives an easy way of analysing data. The chart in Excel helps to visualize the data graphically. There are various types of charts available in Excel like Column, Line, Pie, Bar, Area etc.

Steps to Insert Charts

- ❖ Select the data for which you need to create chart.
- ❖ Choose the appropriate chart by clicking on the chart icons available from the Charts group of Insert Menu.
- ❖ By selecting the inserted chart, it can be resized as per the requirement and be placed wherever required

EXERCISES

1. Fill in the blanks with the correct answer by using the given clue words.

Freeze Panes / View side by side / Synchronous Scrolling / worksheets / Alphabet and Numbers

1. _____ is used to view two workbooks at a time on the screen.
2. _____ is used to scroll down two spreadsheets at a time.
3. _____ is used to keep the first row or some selected rows visible while scrolling down.
4. In excel a cell is named with the combination of _____.
5. By default a workbook has three_____.

2. State True or False.

1. A formula begins with the sign \$.
2. The colon (:) is used to specify the range of cells.
3. MAX function is used to find the maximum value in the range of cells.
4. Freeze panes option is used to keep one or more rows or columns visible while scrolling.
5. The chart in Excel helps to draw pictures or painting.

3. Answer the following

1. What do you mean by a formula in MS-Excel?

2. Name any four operators and its purpose?

3. Explain the purpose of the functions: SUM, ROUND, MAX

4. Write the steps to insert rows in Excel?

5. Write any three different views of Excel Worksheets.

4. Practical Problem

1. Create a table in the sheet1 of a new workbook using Microsoft excel. Enter 10 Students mark details with the fields S.No.,R.No., Name, English marks, Hindi marks, maths marks and EVS marks.

1. Delete sheet2 and Sheet 3 from the workbook.
2. Rename sheet1 as marks.
3. Insert a new column named class/sec after the Name column.
4. Change the width of the Name column as 25
5. Change the row width as 10 for all the rows
6. Save the excel file with the name "Marklist"
7. Open the workbook named "Marklist"
8. Freeze the first row. Save the file and close it.

2. Create a sheet named "CCA Prize List" with the fields S.No.,R.No., Name and No. of CCA prizes won in a new workbook for the same set of students whose marks are entered in "Mark list" workbook. View the "Mark list" workbook and "CCA Prize List" workbook side by side and scroll down synchronous

CHAPTER 7

Number Systems

Introduction to Number Systems

From the early days of human civilization, people used to count things using their fingers, sticks or any other things. Later on, number of things they count becomes more and more, so they found the inefficiency of that system. They introduced a new system for counting based on the weighted number system. The general number system used all over the world is called decimal number system which has 10 different symbols and set of weights (1, 10, 100, 1000etc.).

The number system is the way to represent numbers or symbols in computer system. This is also called as positional number system because the value of the each symbol depends upon the position of the digits within the number system.

Applications of the Number Systems

- ◆ Computer is a machine which works on the principles of mathematics and physics. It simply stands for “to compute” so the computation takes place on numbers.
- ◆ It represents the electronic states like ON or OFF
- ◆ Memory locations are identified, called address, using number systems
- ◆ It helps in the design of computer languages.

Types of Number Systems

In mathematics you must have heard the number systems such as whole numbers and real numbers. Let us see the four number systems which are used in the design of computer architecture. They are

1. Decimal Number Systems
2. Binary Number Systems
3. Octal Number Systems
4. Hexa Decimal Number Systems

These number systems are explained below.

Decimal number system

The Decimal number system is the most widely used number systems in the world. It consists of ten digits ranging from 0 to 9 and it represents a numeric value. The base of decimal number system is 10, because it has only 10 digits.

The value of the each digit in a number is based on its weight and position of the digits. The value of the position is increased by 10 times from right to left order in the number.

$$\begin{aligned} &\text{For example, the value of 345 is} \\ &= 3 \times 10^2 + 4 \times 10^1 + 5 \times 10^0 \\ &= 300 + 40 + 5 = 345 \end{aligned}$$

Binary Number System

The computer is made up of digital circuits, hence the data or information must be represented using binary number system in the form of 0 and 1 as these digits represents 'on' and 'off' state of the electronic switch. The combination of 1 and 0 forms a binary number. It is called as binary number system because it uses only two digits, hence the base of the number system is 2.

The binary number system uses positional value and each digit is *multiplied by the appropriate powers of two based on its position.*

$$\begin{aligned} &\text{For example, } (1001)_2 \text{ in decimal is} \\ &= 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 \\ &= 1 \times 8 + 0 \times 4 + 0 \times 2 + 1 \times 1 \\ &= 8 + 0 + 0 + 1 \\ &= (9)_{10} \end{aligned}$$

Octal number system

The term Octa means 8, so the octal number system has the base of 8 and the symbols are from 0 to 7. The positional value plays an important role in expressing the numbers. Each digit is *multiplied by the appropriate powers of eight based on its position.* An Octal digit is represented by 3 bits in binary number system (i.e. $2^3 = 8$)

$$\begin{aligned} &\text{For example, } (63)_8 \text{ in decimal is} \\ &= 6 \times 8^1 + 3 \times 8^0 \\ &= 48 + 3 = (51)_{10} \end{aligned}$$

Hexadecimal number system

It is the combination of decimal number systems, such as 10 digits (0 to 9), and an additional six (hexa) symbols such as A, B, C, D, E & F. The base of the hexadecimal number system is 16, because it has 16 alphanumeric values. Each digit is *multiplied by the appropriate powers of sixteen based on its position*. An octal digit is represented by 4 bits in binary number system (i.e. $2^4 = 16$)

The summary of various number systems with its base (radix) and symbols are as follows

S.No	Number System	Base/Radix	Symbols used
1.	Binary	2	0 and 1
2.	Decimal	10	0,1,2,3,4,5,6,7,8,9
3.	Octal	8	0,1,2,3,4,5,6,7
4.	Hexa decimal	16	0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F

Binary number system

It consists of only two digits such as 0 and 1 for representing any symbols in the computer. A computer consists of electronic circuits, which can exist only in one of the two states either ON or OFF. So to represent the state ON, the digit 1 is used, and to represent OFF state, the digit 0 is used. With these digits computer can easily manipulate numbers stored in memory for addition, subtraction, multiplication and division operations. The binary number system works like the decimal number system, but uses base 2 and the symbols are 0 and 1.

The weighted values for the position of binary number system are as follows

2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}
32	16	8	4	2	1	0.5	0.25	0.125

Different formats of binary number system

The sequence of bits in binary number system can be defined as boundaries. They are as follows

Unit name	Size (bits)	Example
Bit	1	0 or 1
Nibble	4	1010
Byte	8	0001 1010
Word	16	1010 0001 1010 1010
Double word	32	Group of 32 bits

BIT: A bit is the smallest unit of data on a binary computer, which takes either 0 or 1.

NIBBLE: A nibble is a collection of 4 bits. It is used in BCD (Binary Coded Decimal) and hexa decimal systems. We can represent up to 16 distinct values. Format: $b_3b_2b_1b_0$ ($2^4 = 16$)

BYTE: It is a group of 8 bits or set of 2 nibbles. A byte can be represented as follows

$b_7b_6b_5b_4b_3b_2b_1b_0$
High order bit  Low order bit

A byte can identify up to 256 ($2^8 = 256$) distinct values or symbols.

WORD: A word is a group of 16 bits or 32 bits depends upon the processor of the computer system.

Binary Arithmetic

Like decimal number system, we can perform all arithmetic operations such as addition, subtraction, multiplication and division on binary number system also. Since the binary number system deals with only two digits i.e. 0 and 1, the result of arithmetic operation also will be in the form of 0's and 1's.

Binary Addition

The following truth table summarizes the addition of any two binary digits

A	B	A+B
---	---	-----

0	0	0
0	1	1
1	0	1
1	1	10

(1+1 is not 2, since binary uses only two symbols such as 0 and 1. It is similar to 9+1=10 in decimal number system. Note: addition of 1+1+1 is 11, 1+1+1+1=100, 1+1+1+1+1=101 etc.)

Eg. Add binary numbers 101101 ₂ + 101111 ₂	Add binary numbers 11+101
Carry----> 11111	Carry----> 11
First number----> 101101	First number----> 11
Second number-> 101111	Second number-> 101
Result-----> 1011100	Result-----> 1000
101101 ₂ + 101111 ₂ = 1011100 ₂	11 ₂ +101 ₂ = 1000 ₂

Binary Subtraction

The following table summarizes the subtraction of any two binary digits

A	B	A-B
0	0	0
1	1	0
1	0	1
0	1	1

(0-1= 1 only if borrow exists in the next higher column)

Eg. Subtract two binary numbers 101101 ₂ - 1111 ₂	Subtract binary numbers 10 ₂ -01 ₂
First number----> 101101	First number----> 10
Second number-> 1111	Second number-> 01
Result-----> 11110	Result-----> 01
101101 ₂ - 1111 ₂ = 11110 ₂	10 ₂ -01 ₂ = 01 ₂

Note: To verify the result, add the result and the second number to get the first number.

EXERCISE

1. Choose the correct answer.

1. Which of the following is not an electronic state(s)
a.ON b. OFF c. Both (a) and (b) d.Button
2. Which of the following is not a number system?
a. Binary b. Real c. Octal d. Decimal
3. The radix of an octal number system is _____
a. 8 b.16 c.2 d.10
4. The value of 2^{-1} is
a. 2 b.1 c. 0.5 d.-1
5. A byte is a group of _____ bits
a. 8 b.16 c.4 d. 32

2. State True or False.

1. In binary number system $1_2 + 1_2 = 2_2$.
2. A bit is a group of 4 bits.
3. The octal number system uses the symbols 0 to 7.
4. The base of the binary number system is 2.
5. A word is equivalent to a byte.

3. Answer the following

1. What are the applications of the number systems?

2. Name the four types of number systems with its base.

3. Define binary number systems.

4. Name memory units with its storage space?

5. Write the truth table of binary addition and subtraction?

6. Do the following binary arithmetic operations?

a. $1011_2 + 101_2 = \underline{\hspace{2cm}}_2$

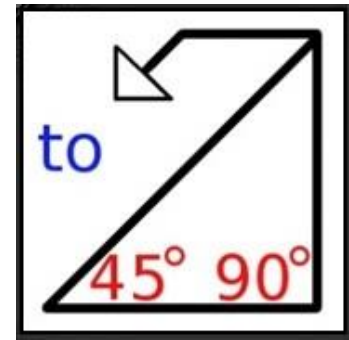
b. $100010_2 + 1111_2 = \underline{\hspace{2cm}}_2$

c. $10101_2 - 1001_2 = \underline{\hspace{2cm}}_2$

d. $1010_2 - 101_2 = \underline{\hspace{2cm}}_2$

CHAPTER 8

Programming with Logo – Part-2



Introduction

You have already learnt in your previous class about the basics and commands of Logo (Part-1). In this lesson, we shall learn the advanced commands and procedures of Logo. Let us revise the commands discussed in the previous class.

Command	Description	Example
FORWARD/FD n	It moves the turtle n units forward	FD 100
BACK/BK n	It moves the turtle n units backward	BK 50
RIGHT d	It turns the turtle clockwise n degrees	RT 90
LEFT n	It turns the turtle counter clockwise n degrees.	LT 45
PENUP/PU	Turtle's pen moves without drawing i.e., pen is up.	PU
PENDOWN/PD	Turtle's pen is in the down position.	PD
PENERASE / PE	Turtle erases as it moves.	PE
HIDETURTLE /HT	Removes the symbol 'triangle' of turtle from the screen.	HT
SHOWTURTLE/ ST	Makes the Turtle visible again.	ST
CLEARSCREEN/ CS	Erases the screen and returns the Turtle to the centre of the drawing screen.	CS
HOME	Returns the Turtle to the "home" position without erasing the screen. You can use PU to move without drawing.	HOME
LABEL [Text] / LABEL " Text"	Displays text at the Turtle location. The Text using double quotes displays the text with double quotes and the text given in index brackets ([]) displays without quotes.	LABEL [Hello]
SETPENCOLOR 1-15	It sets pen colour Red - 4, Green - 2, Blue - 1 etc.	SETPC 4 for Redcolor
SOUND [mn]	It creates sound with the frequency of m for n milliseconds	SOUND [100 1000]
SETPENSIZE [m n]	Sets width and height of the drawing pen to the values m and n respectively	SETPENSIZE [5 5]
SETXY(x,y)	It positions the turtle at the coordinates x (X-Axis) and y (Y-Axis)	SETXY(60,60)
BYE	Exits Logo	

Let us discuss some of the important logo commands with example.

REPEAT command

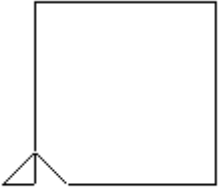
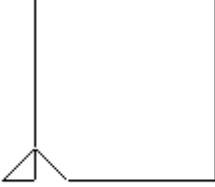
This command is used to repeat the statements for the given number of times. A **repeat** command within another **repeat** is called nested repeat command. The format of the command is

REPEAT n [Commands]

Here n stands for the number of times to be repeated and Commands are any valid Logo commands to be repeated.

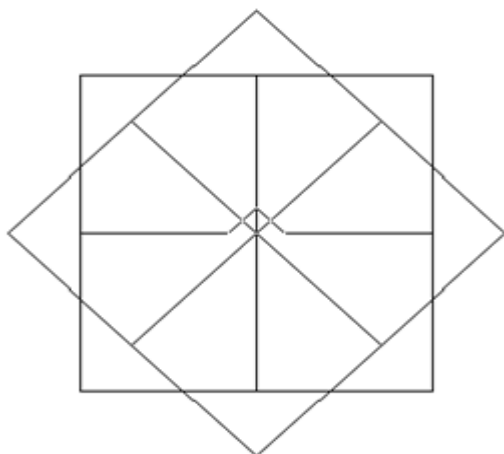
Example-1:

Draw a rectangle using REPEAT command.

Rectangle without repeat command		Rectangle with repeat command
<pre>fd90 rt 90 fd90 rt 90 fd90 rt 90 fd90 rt 90</pre>	<p>The output of the given commands is</p> 	<p>REPEAT 4 [FD 90 RT 90]</p> <p>The output of the command is</p> 

Here both the commands display the same output but the second method simplifies the coding.

Example-2:



Consider the following diagram to understand the use of nested repeat command.

The command to create the given diagram is

repeat 8 [repeat 4[fd 100 rt 90] rt 45]

The command **repeat 4[fd 100 rt 90]** creates a rectangle and this is repeated for 8 times with an angle of 45 to get the desired output.

Try the above command with different values to observe the different patterns.

Procedures

A procedure in Logo helps to place a set of commands together so that they can be executed sequentially. The procedure can be created with or without arguments. The three parts of a procedure are as follows

TITLE: It specifies the name of the procedure.

BODY: is a set of commands that will be executed when we execute the procedure by name.

END : This tells logo that the procedure has come to an end.

The general format of the procedure is as follows

```
To procedurename  
body  
end
```

Here **to** & **end** are the keywords that states the beginning and end of the procedure. Body contains the valid logo commands or statements.

The comments or remarks can be included in the procedure by prefixing semicolon (;). It is only for understanding purpose and will not be executed by the logo software.

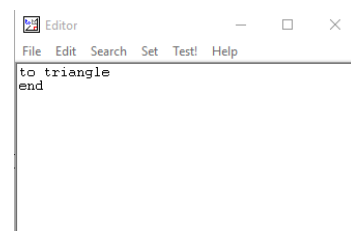
Example 1: Create a procedure to draw a triangle.

Steps:

1. The editor for creating the procedure can be opened in two ways such as EDIT "name of the procedure or using Edall.



2. The editor window opens with **to** **name** & **end** and the required commands can be inserted in the body of the procedure.



3. Type the following command in the body of the procedure

```
REPEAT 3[FD 60 RT 120]
```

4. Save the file by clicking File → Save and Exit
5. Now the procedure is ready to use. Execute the procedure triangle from the command window.e.g. TRIANGLE and press execute.

Operations on Procedures

Saving a procedure

To save a procedure, follow the steps,

- Click on File→Save from the main menu of Logo
- The Save As dialog box is displayed.
- Type a filename in the file name box and click Save.

Loading a procedure

The saved procedure can be loaded in the computer memory and used again. To load the procedure file, follow the steps-

- Select File→Load
- The open dialog appears
- Click the file name in the file list and click Open.
- The procedure file is loaded into the computer memory. We can type the procedure name to execute it.

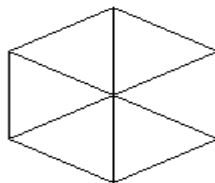
Editing a procedure file

To edit procedure file, follow the steps-

- Open the procedure using the steps given in Loading a procedure
- Click on Edall button from the editor window. The saved procedures will be displayed.
- We can edit the procedure now and then save it.

Example 2:

Create the following picture using procedure



The procedure for the above diagram is as follows

```
TO PICTURE  
  REPEAT 6 [REPEAT 3 [FD 60 RT 120] RT 60]  
END
```

To run the procedure, type PICTURE in command window and press enter.

Logo Programming

Logo was the one of the oldest programming language. It is a student friendly language so that they can learn it easily. Some of the basic elements of programming are given below

1. Variables

A variable is the name assigned to the memory location to store a value. Rules for framing a variable are as follows

- a. Can have letters, numbers or symbols.
- b. Always begin with a letter.
- c. Cannot use Logo commands like Left, PU etc.
- d. Cannot have blank spaces.
- e. Cannot have mathematical signs such as +,-,* and /.

The variables can be created using the command **make** as follows

make *“variable value*

Variable can be a valid logo variable name and the value should be appropriate to the variable. A string value can be prefixed with double quote (“).

Examples:

1. make “a 100
2. make “eng mark 95
3. make “student name “Nethu
4. make “address “Tarapur

Note: The variables can be accessed by prefixing the colon with the variables like :a, :end mark, :student name, :address etc.

2. Print Primitives

The print or pr primitive in logo is used to print the text or number on the screen. The different formats of print command is as follows

1. PRINT “Text - it prints the given text
2. PRINT :a - it prints the value of the variable a
3. PRINT [Writing program in Logo is a fun] – The text given within the index brackets ([]) will print the text as it is i.e., the output will be **Writing program in Logo is a fun**. This format is used to print multiple words in the text with blank spaces.

3. Arithmetic operators

The simple arithmetic operations can be performed using the arithmetic operators. It produces a numerical result. The various arithmetic operators used for arithmetic operations are as follows.

Operator	Purpose	Example
+	Addition	a+b+c, mark1+mark2
-	Subtraction	a-b, gross-ded
*	Multiplication	a*b, hours * rate
/	Division	c/d, total/4

Example 1:

Write a procedure to find the sum and difference of two numbers

The logo program is to sum diff make "a 100 make "b 200 make "sum :a + :b make "diff :a - :b print "sum print :sum print "Difference print :diff end	The output is sum 300 Difference -100
--	---

Example 2:

Write a procedure to find the area and circumference of a rectangle

The logo program is to area make "a 10 make "b 20 make "area :a * :b make "cir 2 * (:a + :b) print "Area print :area print "Circumference print :cir end	The output is Area 200 Circumference 60
--	---

Logo functions

The ready-made or built-in functions in logo are the pre-written programs which can be used directly for finding the result without writing any code for the function. The following functions return the appropriate result supplying the parameters.

S.No.	Function	Purpose	Example	Result
1.	sqrt n	It returns the square root of the positive number n.	sqrt 9	3
2.	power m n	It calculates the power value of m raised to n i.e., m^n	power 2 3	8
3.	abs n	It returns the absolute value of n i.e. positive equivalent of negative number.	abs -25	25
4.	int n	It truncates the fractional part of the number and returns only integer part.	int 26.75	26
5.	modulo m n	It returns the remainder of the division m by n	modulo 8 3	2
6.	random n	It returns any random number less than n	random 25	23
7.	round n	It rounds to the nearest integer.	round 23.6 round 12.1	26 12

EXERCISE

1. Fill in the blanks.

1. The Logo command to clear the screen is _____
2. _____ Command is used to removes the symbol 'triangle' of turtle from the screen.
3. A repeat command within another repeat is called _____ repeat command.
4. The command to create a variable in Logo programming is _____
5. _____ Command prints the result or texts on the screen.

2. State True or False.

1. The operator used for division is %.
2. The function sqrt 16 gives the result as 4.
3. SOUND [m n] creates sound with the frequency of m for n milliseconds.
4. **from** and **end** are the keywords used to create the procedure in Logo.
5. A variable can begin with a number.

3. Answer the following

1. Write the syntax of repeat command with an example?

2. How will you include remarks/comments in a Logo procedure?

3. Write the steps to save a procedure in Logo.

4. What are the rules to create a variable?

5. Write a short note on arithmetic operators.

6. Write the purpose of the library functions: sqrt, power, round

5. Try the following logo commands in MSW Logo and draw the output.

```
to circle1  
repeat 36[fd 30 lt 360/36]  
end
```

OUTPUT:

```
to decagon  
repeat 10[fd 100 lt 360/10]  
end
```

OUTPUT:

```
to triangle  
repeat 3[fd 150 lt 120]  
end
```

OUTPUT:

```
to shape3  
repeat 100[triangle rt 30]  
end
```

OUTPUT:

Write the logo procedure using repeat to draw a rectangle.



Write the Logo commands to draw a house.

