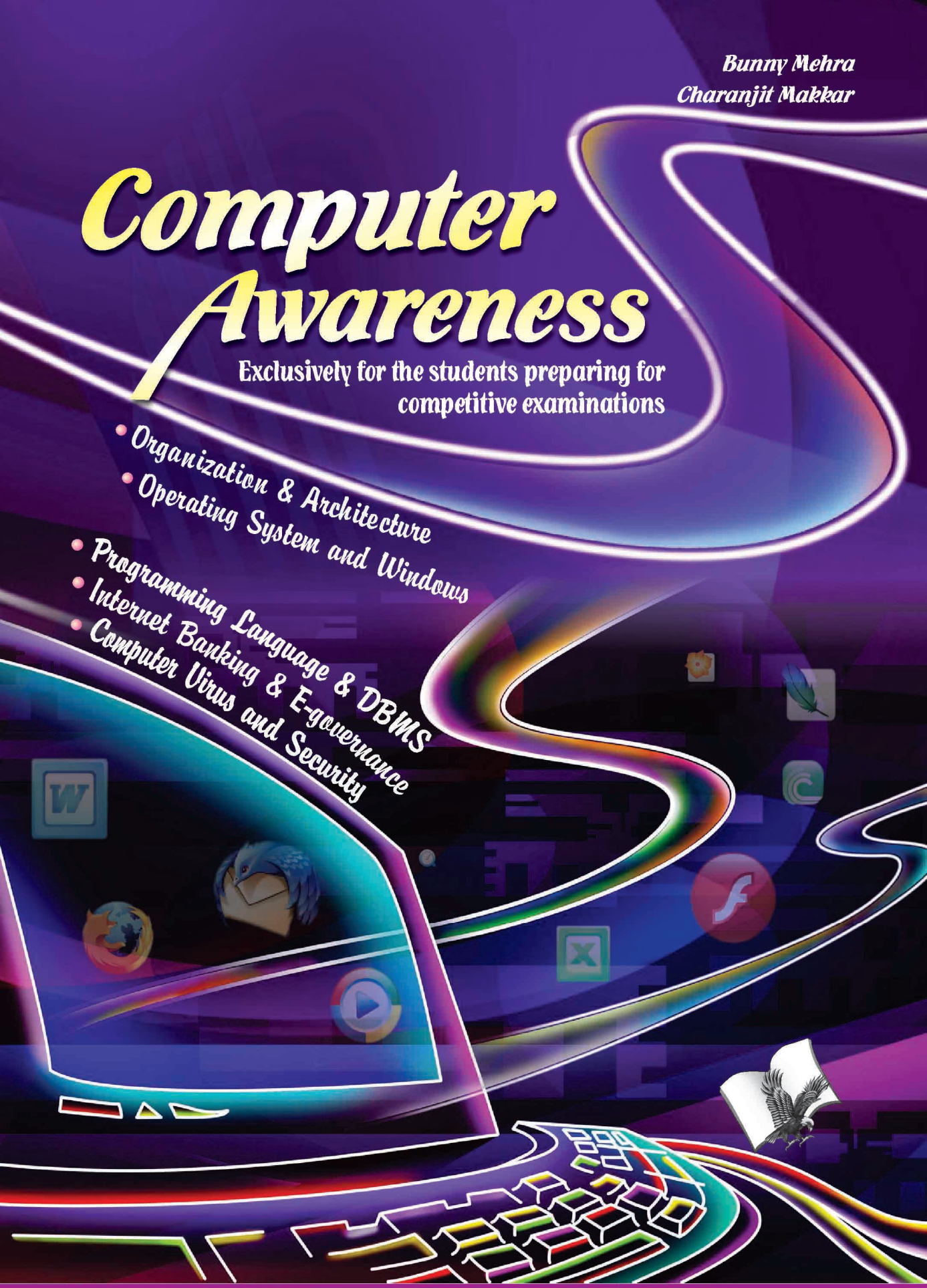
Bunny Mehra
Charanjit Makkar

Computer Awareness

Exclusively for the students preparing for competitive examinations

- Organization & Architecture
- Operating System and Windows
- Programming Language & DBMS
- Internet Banking & E-governance
- Computer Virus and Security



Computer Awareness



Bunny Mehra
Charanjit Makkar

V&S PUBLISHERS

Published by:

V&S PUBLISHERS

F-2/16, Ansari road, Daryaganj, New Delhi-110002
☎ 23240026, 23240027 • *Fax:* 011-23240028
Email: info@vspublishers.com • *Website:* www.vspublishers.com

Regional Office : Hyderabad
5-1-707/1, Brij Bhawan (Beside Central Bank of India Lane)
Bank Street, Koti, Hyderabad - 500 095
☎ 040-24737290
E-mail: vspublishershyd@gmail.com

Branch Office : Mumbai
Jaywant Industrial Estate, 1st Floor–108, Tardeo Road
Opposite Sobo Central Mall, Mumbai – 400 034
☎ 022-23510736
E-mail: vspublishersmum@gmail.com

Follow us on:

© Copyright: V&S PUBLISHERS
ISBN 978-93-505793-3-6

DISCLAIMER

While every attempt has been made to provide accurate and timely information in this book, neither the author nor the publisher assumes any responsibility for errors, unintended omissions or commissions detected therein. The author and publisher makes no representation or warranty with respect to the comprehensiveness or completeness of the contents provided.

All matters included have been simplified under professional guidance for general information only, without any warranty for applicability on an individual. Any mention of an organization or a website in the book, by way of citation or as a source of additional information, doesn't imply the endorsement of the content either by the author or the publisher. It is possible that websites cited may have changed or removed between the time of editing and publishing the book.

Results from using the expert opinion in this book will be totally dependent on individual circumstances and factors beyond the control of the author and the publisher.

It makes sense to elicit advice from well informed sources before implementing the ideas given in the book. The reader assumes full responsibility for the consequences arising out from reading this book.

For proper guidance, it is advisable to read the book under the watchful eyes of parents/guardian. The buyer of this book assumes all responsibility for the use of given materials and information.

The copyright of the entire content of this book rests with the author/publisher. Any infringement/transmission of the cover design, text or illustrations, in any form, by any means, by any entity will invite legal action and be responsible for consequences thereon.

Publisher's Note

After publishing various general trade and mass appeal books, V&S Publishers is pleased to bring out a series of books, ***The Gen X series*** *which means* ***generating Xcellence in generation X*** and which focuses on the youths and brilliant students. Under the series, we are going to publish a book 'Computer Awareness', which is useful for beginners, students, programmers, and professionals. Today, in case a candidate does not know computer fundamentals and basic operations, he/she cannot perform well in the exam though he/she might be a brilliant student. Keeping in mind the trend of online/entrance exams through computers and to make the candidates aware of the computer operations, we have brought out 'Computer Awareness' for all the aspirants.

The book has been designed to cover almost all main topics including Fundamentals, Operating Systems, Programming, DBMS, and Internet Banking and E-governance, and Computer Security. It covers syllabus of various competitive exams throughout India. The book provides a lot of conceptual information and MCOs with their solutions to the aspirants of most competitive exams. It presents the contents in very systematic way i.e. from basics to advanced learning. Every chapter of the book contains a theory explained with examples and MCQs with Answer Key for practice. Five Model Test Papers have been provided for practice and to know the pattern of questions asked in different competitive exams. The students can evaluate their skills in computers through Assignments provided in the book. The chapter on Gadgets discusses the latest technological developments in the field of computers.

Features:

- ♦ Precise theory explained through examples
- ♦ MCQs with solutions for thorough practice
- ♦ Model Test Papers for doing exam practice
- ♦ Assignments to evaluate your preparation level
- ♦ Presented in systematic and consistent manner

We suggest that the readers should go through each chapter of the book to get thorough knowledge of the concepts and to do practice through the objective questions based on the pattern of various competitive exams at national level. The book has been written in simple and lucid language and will prove to be very useful for various competitive exams.

Contents

Section 1 : Computer

1. Introduction to Computers 7
2. Computer Organization and Architecture 35
3. Operating System and Microsoft Windows 48
4. Microsoft Office 60
5. Data Representation 83
6. Data Structure 96
7. Boolean Algebra 106
8. Programming in C 113
9. Object Oriented Programming Language (OOPS) 119
10. Database Management System (DBMS) 123
11. Networking and Internet 128
12. Internet Banking and E-governance Terminology 146
13. Computer Security 155
14. Gadgets 163

Section 2 : Assignment

1. Assignment – 1 168
2. Assignment – 2 172
3. Assignment – 3 176
4. Assignment – 4 179

Section 3 : Model Paper

1. Model Test Paper – 1 184
2. Model Test Paper – 2 188
3. Model Test Paper – 3 192
4. Model Test Paper – 4 196
5. Model Test Paper – 5 200

Section – 1
COUMPTER

CHAPTER – 1

Introduction to Computers

Computer is an electronic device that can accept, process, store and output data according to the instructions given by the user.

Data and Information

Data

Data are raw facts and figures. It is unprocessed information. For example, take yourself. You may be 6 feet tall, have black hair and brown eyes. These all are data values. Plain data is generally useless. For example, "100 kg" does not give any information.

Data can be numeric, alphanumeric, date, time and Boolean:

Numeric data

Numeric Data means numbers. But numbers are also of various types:

- **Integer:** An integer is a whole number (without a decimal or fractional part). It can be positive or negative. Example: 123, 10, -6, -90.
- **Real Number:** Real numbers in addition to integers include the numbers with decimal/fractional parts. They can also be positive or negative. Example: 5, 1.44, - 8, - 2.5.
- **Currency:** It represents currency data like $10, £ 40.5, ₹ 20.34.
- **Percentage:** Percent means "per hundred". It is denoted with a percent symbol (%). Example: 20% means 0.2, 1% means 0.01.

Alphanumeric data

This data is made up of letters and numbers. You can also use symbols like $, %, @ etc. with them. For example: "Golu is brilliant", ABC123, navneetmehra@gmail.com, i@mthebest.

Date and time data

It is simply used to represent date and time values. Example: 4/1/1989, 15th August, 2014, 12:35 am etc.

Boolean (logical) data

Data which can only have two values of True and False is Boolean/logical data. Example: True, False, Yes, No.

Information

Information is meaningful processed data. Generally, information is the message that is being conveyed, whereas data are plain facts. Data is used as input for the computer system whereas information is the output of data.

Computer Functional Cycle

For every operation, computers follow the stages of Input > Process > Output > Storage. Here:

(i) The INPUT stage refers to putting information into the system.
(ii) The PROCESS stage refers to doing something with the information.
(iii) The OUTPUT stage refers to displaying results.
(iv) The STORAGE stage refers to keeping data when the computer is switched off.

Development of Computer

Actually speaking, electronic data processing does not go back more than just half a century i.e. they are in existence merely from early 1940's. In early days. when our ancestors used to reside in caves, counting was a problem. When they started using stones to count their animals or their possession, they never knew that this day will lead to the computer of today. People today started following a set of procedure to perform calculation with these stones, which later led to creation of a digital counting device, which was the predecessor of the first calculating device invented, was known as ABACUS.

The Abacus

Abacus is known to be the first mechanical calculating device which was used to performed addition and subtraction easily and speedily. This device was first developed by the Egyptians in the 10th century B.C, but it was given its final shape in the 12th century A.D. by the Chinese educationists. Abacus is made up of wooden frame in which rods were fitted across with round beads sliding on the rods. It is divided into two parts called 'Heaven' and 'Earth'. Heaven was the upper part and Earth was the lower one. Thus any number can be represented by placing the beads at proper place.

Napier's Bones

As the necessity demanded, scientist started inventing better calculating device. In this process, John Napier's of Scotland invented a calculating device, in the year 1617 called the Napier's Bones. In the device, Napier used the bone rods for the counting purpose. Some numbers are printed on these rods. These rods can be used to do addition, subtraction, multiplication and division easily.

Pascal's Calculator

In the year 1642, Blaise Pascal, a French scientist invented an adding machine called Pascal's calculator, which represents the position of digit with the help of gears in it.

Leibnz Calculator

In the year 1671, a German mathematician, Gottfried Leibniz modified the Pascal calculator and he developed a machine which could perform various calculation based on multiplication and division as well.

Analytical Engine

In the year 1833, a scientist from England known to be Charles Babbage invented such a machine which could keep our data safely. This device was called Analytical engine and it deemed to be the first mechanical computer. It included such feature which is used in today's computer language. For this great invention of the computer, Sir Charles Babbage is also known as the father of the computer.

Evolution of Computers

The computer was invented not for entertainment or email purpose like we use them today. They were made out of a need to solve a serious number-crunching crisis. By 1880, the U.S. population had grown so large that it took more than seven years to tabulate the U.S. Census results. That time, their government looked out for a faster way to get the job done, which gave rise to punch-card based computers that occupied entire rooms. Today, we carry powerful computing service on our smartphones that easily fit in our pockets. The following table takes you through the evolution of computer over the years.

Roman Empire	The ancient Romans developed an Abacus, the first "machine" for calculating.
1617	John Napier invented logarithms. He inscribed logarithmic measurements on a set of 10 wooden rods and thus was able to do multiplication and division by matching up numbers on the rods. These came to be known as Napier's Bones.
1642	Blaise Pascal, a French mathematical genius, at the age of 19 invented a machine, which he called the Pascaline that could do addition and subtraction. Pascal's machine consisted of a series of gears with 10 teeth each, representing the numbers 0 to 9. As each gear made one turn it would trip the next gear up to make 1/10 of a revolution. The Pascal programming language was named in his honor.
1673	Gottfried Wilhelm von Leibniz invented a calculating machine known as Leibniz's Wheel or the Step Reckoner. It could add and subtract, like Pascal's machine, but it could also multiply and divide.
1822	English mathematician, **Charles Babbage** devised a steam-driven calculating machine that was able to compute tables of numbers. Charles Babbage also created the Difference Machine in the 1820s. He was also known as Father of Computer Science. He also invented the analytical engine.
1890	**Herman Hollerith** designed a punch card system to calculate the 1880 census of US. He also established a company that ultimately became **IBM.**
1937	**J.V. Atanasoff,** a professor of physics and mathematics at Iowa State University, attempted to build the first computer without gears, cams, belts or shafts.
1941	Atanasoff and his graduate student, Clifford Berry, designed a computer that could solve 29 equations simultaneously. It was the **first time a computer was able to store information** in its main memory.
1943-1944	Two University of Pennsylvania professors—John Mauchly and J. Presper Eckert—built the **Electronic Numerical Integrator and Calculator (ENIAC)**. It occupied 20 foot by 40 foot room and had 18,000 vacuum tubes.
1946	Mauchly and Presper left the University of Pennsylvania and received funding from the Census Bureau to build the **UNIVAC**, the first commercial computer for business and government applications.
1953	**Grace Hopper** developed the first computer language, which was eventually known as **COBOL**.
1954	The **FORTRAN** programming language was born.
1958	Jack Kilby and Robert Noyce unveiled the **integrated circuit**, known as the computer chip.
1964	Douglas Engelbart showed a prototype of the modern computer, with a **mouse and a graphical user interface (GUI).**
1970	The newly formed Intel unveiled the Intel 1103, the **first Dynamic Access Memory (DRAM) chip.**

1971	Alan Shugart lead a team of IBM engineers who invented the **"floppy disk,"** by which data could be shared among computers.
1973	Robert Metcalfe, a member of the research staff for Xerox, developed **Ethernet** for connecting multiple computers and other hardware.
1975	The **IBM 5100** became the first commercially available portable computer.
1976	**Steve Jobs and Steve Wozniak** started Apple Computers on April Fool's Day and rolled out the Apple I, the first computer with a single-circuit board.
1978	**VisiCalc,** the first computerized spreadsheet program was invented.
1979	**Word processing** became a reality asMicroPro International released WordStar.
1981	The **first IBM personal computer**, code named "Acorn," was introduced. It used Microsoft's MS-DOS operating system.
1983	**Apple's Lisa** was the first personal computer with a GUI. It also featured a drop-down menu and icons. It flopped but eventually evolved into Macintosh. The Gavilan SC was the first portable computer with familiar flip form factor and the first to be marketed as a "laptop."
1985	Microsoft announced **Windows**, its response to Apple's GUI.
1985	The **first dot-com domain name was registered** on March 15, years before the World Wide Web would mark the formal beginning of the Internet history. The Symbolics Computer Company, a small Massachussets computer manufacturer, registered Symbolics.com.
1986	Compaq brought the **Deskpro 386** to market. Its 32-bit architecture provided speed comparable to mainframe computers.
1990	**Tim Berners-Lee,** a researcher at CERN, the high-energy physics laboratory in Geneva, developed HyperText Markup Language **(HTML),** giving rise to the World Wide Web.
1993	The **Pentium microprocessor** advanced the use of graphics and music on PCs.
1999	The term **Wi-Fi** became part of the computing language and users began connecting to the Internet without wires.
2000	Sony released the **PlayStation 2**.
2001	Apple unveiled the **Mac OS X** operating system, which provides protected memory architecture and pre-emptive multi-tasking, among other benefits. Not to be outdone, Microsoft rolled out **Windows XP**, which has a significantly redesigned GUI.
2003	The **first 64-bit processor**, AMD's Athlon 64, became available to the consumer market.
2004	Mozilla's **Firefox** 1.0 challenged Microsoft's Internet Explorer, the dominant web browsers.
2006	Apple introduced the MacBook Pro, its **first Intel-based, dual-core mobile computer**, as well as an Intel-based iMac. Nintendo's Wii hits the market.
2007	The **iPhone** brouhgt many computer functions to the smartphone.

2009	Microsoft launched **Windows 7**, which offers the ability to pin applications to the taskbar and advances in touch and handwriting recognition, among other features.
2010	Apple unveiled the **iPad,** changing the way consumers view media and jumpstarting the dormant tablet computer segment.
2012	On October 26, 2012, Microsoft released Windows 8 to the public. Windows 8 features a redesigned user interface, designed to make it easier for touchscreen users to use Windows.
Windows 10	Windows 10 is the current release of the Microsoft Windows operating system. It was released on July 29, 2015. It is being distributed without any charge to Windows 7 and 8.1 users for the first year.

The Generation of Computer

"Generation" in computer talk is a step in technology. Till today, there are five computer generations. Following table briefs you about each of them:

Generation	Duration	Memory Device	Features	Example
First	1942-1955	Vacuum Tubes or Valves	• used vacuum tubes as electronic circuit • magnetic drum for primary storage • mercury delay lined for memory • punch-card used as secondary storage • machine level programming used • operating speed was used in terms of millisecond	Mark-I UNIVAC, ENIAC, EDSAC
Second	1955-1964	Transistor	• magnet core memory used as internal storage • magnet tapes used as secondary storage • little bit faster I/O devices • high level language used as programming • processing speed measured in microsecond	IMB 1401, ICL 2950/10
Third	1964-1975	IC(Integrated circuits)	• semi conductor memory used as primary storage • magnetic discs were used as secondary storage • massive use of high level language • processing speed increased to nanoseconds and even faster	IBM 360 series, UNIVAC 9000

Fourth	1975-1990	VLSI or Microprocessor	• massive use of magnetic and optical storage devices with capacity more than 100 GB • advancement in software and high level language • use of fourth generation language(4GL) • operation speed increased beyond picoseconds and MIPS (Millions of Instructions Per Second)	IBM PC, Pentium PC, Apple/ Macintosh
Fifth	1990+	Bio-Chips	• AI will make computer Intelligent and knowledge based • very high speed, PROLOG (programming language)	

Characteristics of Computer

Speed: Computers can carry out various tasks with lightning speed. For example, a task(like a complex calculation) which may take hours when done manually can be done only in few minutes(or even less) when done by computers.

Storage: Computers can store large amount of information. It can be stored in its main memory or in auxiliary memory devices like the Hard Disk, CDs etc. These storage devices will occupy much lesser space when compared to equivalent paper documents.

Accuracy: The accuracy of a computer is very high. Due to its quality, computer finds its extensive use in various fields such as Scientific Research, Weather Predictions etc.

Versatility: Computers are versatile in nature. This means they can perform almost any task, from simple addition, subtraction calculations to payroll construction, from hotel billing to online banking and almost any imaginable task in every day of life.

Automation: One of the important characteristics of computers is that it is automatic in its operation. This means it can be programmed to perform a series of tasks which it will carry out one after another on its own, without human interventions until the program is completed.

Diligence: Computers being electronic machines do not get tired or lose their concentration over the time like human beings. If a large number of calculations are to be done, the output will always remain the same even if repeated any number of times continuously. But if a human being is asked to do the same job, this consistency might not be achieved.

Reliability: As the result being computed by computers are very accurate and it is calculated at high speed in timely manner as well, one can rely on them for correct results.

Uses of Computers

Military: The fast computational ability and the accuracy of digital computing enable the military services to perform certain key operations more quickly. This involves less risk to themselves and less cost to government.

Business Applications: Computers find their extensive use in business from the stage of manufacturing till the stage of its use. Following are some of its specific uses:

(a) A manager uses computer to control the work schedule, communicate with his team and manage data and all the information about company and competitors.
(b) Computers are used to keep all the employee records and prepare their salary every month.
(c) A computer can keep automatic checks on the stock of a particular item.

Creative Arts: Graphic artists use programs such as Adobe Illustrator and Photoshop to create posters, ads, and newsletters. In a similar way, web designers use computers to design websites.

Education*:* Computers are widely used in education sector. They are primarily used to facilitate learning online (e -learning). They allow students to learn various courses online, from Maths to English to Programming and many other subjects. Nowadays, many exams are also taken online using computers.

Financial Application: The online stock market is the most common application which traders use for sales and purchase of shares. To do an online transaction using your debit cards, credit cards or net banking, a computer is required. Even the ATM machines from where you withdraw money is a type of computer which after taking required inputs from you gives you money and deducts the same from your bank account.

Commutation: Many computers are used in commutation industry. Air-travel computers control air traffic safely, warn pilots of any possible midair collisions and help pilots in navigation. Road-travel computers help drivers navigate and help engines run more efficiently and cleanly. Rail-travel computers help trains navigate safely and warn the drivers of any mid-track collisions. Water-travel computers help the captains of the ships to navigate properly in the water and warn them about collision with any water creature or other water vehicle.

Space Applications: The difficult task of tracking and detecting objects orbiting the Earth, such as satellites and rockets can only be accomplished easily with the use of computers. Computers using algorithms and software take the data from weather balloons and satellites and predict what the future weather might be.

Robotics: On different ports of your computers, you can add your own hardware to control your robot. They are also used to control different mechanical devices because of their small size which has been developed over the last few years.

Medical Sciences: In today's world, computers usage has enhanced the medical field:

(a) Different computer applications have been developed to record patient information, monitor reports generated by diagnostic systems etc.
(b) In high level hospital, doctors are able to access patient information systems from a centralized database and then accordingly suggest treatment.

Scientific Research: The computer is used in the field of science for various work like research, calculation, and database. In science, research scientists:

(a) obtain information using computers
(b) analyse and manage their research data
(c) present their observations and
(d) store the research findings in computers.

Administration: Computers act as undisputed assets, especially for administration purposes like:

(a) An administration needs computers to keep the records of all the activities in school/offices, subjects/projects, schedules of all departments, meetings etc.

(b) Computers help in efficient administration of all the account related work in an organization. They are reliable in keeping records and computing budgets.
(c) Every organization has personnel records stored on computers. They include personal details, positions in organization, specialization, and many other details.

Artificial Intelligence: Computers with artificial intelligence techniques lead to rapid transformation. It enables the construction of intelligent systems that are capable of learning from their experience, plan their future actions, and solve complex problems easily.

Networking and Internet*:* Networking and internet fields have large number of uses which will not be possible without a computer itself. Some of the important ones are:

(a) If a business has more than one computer, chances are they will be connected in the network. Computers connected in a network can easily exchange data files among the systems in a secured manner.
(b) Using the Internet, you open yourself an access to a very wide world of web from where you can do many activities like send email, search information, connect to friends via social networking sites, read news etc.

Classification of Computers

Computers differ based on their data processing abilities. They are classified according to **design**, and **data they manipulate**.

Based on Purpose

According to purpose, computers are either general purpose or specific purpose.

Special purpose

Specific purpose computers are designed to handle a specific problem or to perform a specific task. A set of instructions is built into the machine.

General purpose

General purpose computers are designed to perform a range of tasks. They have the ability to store numerous programs, but lack speed and efficiency.

Based on Application

We can identify three different classes of computers if we look upon how a computer works or what they are applied for – Analog, Digital and Hybrid computers.

Analog

- An analog computer uses continuous range of values.
- The values could be electrical, mechanical, or hydraulic quantities.
- It generally deals with physical variables such as voltage, pressure, temperature, speed, etc.
- These computers are used in hospitals, aircrafts and so on.
- A more recent and common mechanical analog computer is the slide rule.

Digital

- Digital computers perform calculations and logical operations with quantities represented as digits, usually in the binary number system.
- In digital computers, expressions are represented as binary digits (0 and 1) or LOW and HIGH values and all operations are done using these digits at a very high rate.
- Nowadays, when we use the word computer, we mostly refer to a digital computer only.

Hybrid (Analog + Digital)

- Hybrid computers are computers with combined features of both digital and analog type.
- Desirable features of analog and digital machines can be combined to create a Hybrid Computer.
- E.g., an analog device measures patient's heart beat (ECG). These measures will be converted into digital form and a digital device checks for any abnormality. We can also input digital data like your marks and get digital results like the result of your class. Another example is a Modem (modulator demodulator).

Types of Computer

Supercomputers

Introduced in 1960's, they have the fastest processing power. Flop/s (Floating Point Operations per Second) is used to measure the processing power of Supercomputer. They are used for highly complex computing purposes like weather forecasting, nuclear research, animated graphics etc. CDC6600 was the first Supercomputer designed by Seymour Cray in 1964. HP's latest Supercomputer with 172.60 TeraFlops is the current top supercomputers in India.

Mainframes

Introduced in 1950's, they are large computers with good processing speed and storage capabilities. They find their extensive usage for back end data processing, banking, airline industry etc for the last many years. MIPS (Millions of Instructions per Second) is used to measure the processing power of mainframes.

Minicomputers

Minicomputer, introduced in 1960's is a class of small computers that is intermediate between a microcomputer and a mainframe in size, speed, and capacity. It can support time-sharing feature.

Microcomputers

A microcomputer is a computer with a central processing unit (CPU) as its microprocessor. They became popular in the 1970s and 80s when the powerful microprocessors came into light.

Personal Computers

Many microcomputers (when equipped with a keyboard for input and screen for output) are known as personal computers. They are the most common computing device that can be seen in office, school and home desk. As its name suggests, personal refers to the point that it is designed for use by single person at a time. It supports applications for word processing, database management, financial analysis, gaming etc.

Notebook

These are portable computers having the keyboard, monitor, and mouse present in a single unit, in a form of folding book-style. They are well known as Laptop computers. Laptops, nowadays, come equipped with a webcam and a microphone. They can be either powered from a rechargeable battery, or by mains electricity via an AC adapter.

Workstations

A workstation is a computer for specific technical or scientific applications. Generally, they are connected to a local area network (LAN) and they run multi-user operating systems. Any computer which is connected to a network nowadays is termed as workstation but the most common form of them refers to the group of hardware which is offered by companies such as Sun Microsystems, HP and IBM.

Palmtops

Palmtop is a very small computing device that literally fits in your palm. They do not offer all the features of a traditional computer but are limited to only certain functions such as phone books and calendars. They come with a pen like device (instead of a keyboard) for input. They are also called hand-held computers or PDAs (Personal Digital Assistants). They do not have disk drives due to their small size but support slots in which you can attach external disk drives, memory etc.

Functional Components of Computers

A computer can generally be divided into two parts: the hardware and the software. All of the computer's components will fall under one of these categories.

Hardware

Hardware is the physical aspect of the computer. It refers to every computer component that we can touch. They are the actual components that your computer is made of, such as the monitor, mouse, keyboard, CPU, CD/DVD drives, printer, scanner etc.

Software

Software is the non-physical aspect of the computer. It can be defined as any program that you load onto a computer, such as the operating system (like Windows 7, Windows 8 or Windows 10), the server, the internet browser, window media player, etc. It is composed of code and instructions that tells the computer hardware how to operate. There are two types of software:

- Freeware is copyrighted computer software which is made available for use free of charge, for an unlimited time.
- Shareware refers to commercial software that is copyrighted. One needs to either pay one time for it or renew it at intervals for getting regular service.

Hardware

The major hardware components of a computer are:

- Input Devices
- Output Devices
- CPU(Central Processing Unit)
- Storage Devices: Main Memory (Primary Storage) and Secondary Memory (Secondary Storage)

Input devices

An input device is any computer device that can be used to provide/input data to the computer. Most common examples are mouse, keyboard, printer, touch screen monitor (like in ATMs), microphone, web camera etc.

(i) Keyboard: The keyboard is most basic input device that looks pretty much like a standard typewriter keyboard. It follows the basic QWERTY layout of characters for easy use. There are different types of keys in a keyboard.

- **Alphabet keys:** These keys have 26 letters of the English alphabet (marked in capital letters). Their order is not alphabetical but they are arranged such that the operator is able to type the text with good speed. These keys also include some other keys like comma, full-stop, space bar etc.
- **Numeric keys:** These keys are marked with the digits from 0 to 9 and are in the natural order of 1, 2, 3 and so on. There are symbols on top of each of these keys (like @, #, $ etc.) which can be entered by holding down the shift key while clicking the desired number key.

- **Function Keys:** These keys are marked as F1, F2, F3 ……F12 and are present on top of the keyboard. Each of these of keys is used for a special function. For example, F5 is used to refresh the page (when you are working in a web browser).
- **Cursor Control Keys:** These keys (also known as arrow keys) present on the left of the numeric keypad at the bottom are used to move in four directions as marked on the keys.
- **Special Keys:** These keys as the name suggests are present for special purpose. Example of special keys are: Enter Key (when pressed sends the computer a signal that you have completed your command), Caps Lock key (when ON types text in capital letters), Shift Key (this works in combination with other keys), Backspace key (works like an eraser) etc.

(ii) Mouse: Mouse is an input device that controls the movement of the cursor or pointer present on the display screen. You can roll it along a hard and flat surface and as you move it, the pointer on the display screen will move with it in the same direction. Following are common mouse actions:

- **Clicking (single-clicking):** It is used to select (mark) an item or open a menu. To click an item, point towards it and then press and release the left button.
- **Double-clicking:** It is most commonly used to open an item. For example, to open a notepad file present on desktop, you have to double-click on it.
- **Right-clicking:** This option generally displays a list of things you can do with the item. To right-click an item, point towards it and then press and release the right button. For example, on right-clicking the Recycle Bin icon, you will see a menu with options to open it, empty it or delete it.
- **Dragging:** It is used to move files to a different location without traditional copy paste option. To drag an item, point towards it, press and hold the left mouse button, move the item to a new location, and then release the button.

(iii) Trackball: A trackball is a type of input device which consists of a small ball that you roll with your fingers to control the movement of a pointer on a monitor. It is located in front of the keyboard towards the user.

(iv) Touchpad: It is a common input device on laptop computers where they are also used as a substitute for a mouse. As their size is generally small, they can also be found on personal digital assistants (PDAs) and some portable media players.

(v) Touch Screen: It is a display device which allows the user to interact with a computer by touching areas on the screen. Most common example you use in your day to day life is ATM touch screen where with the help of touch screen actions you perform your transaction.

(vi) Joystick: A joystick is an input device commonly used to control video games. It consists of a stick which can move in all directions.

(vii) Scanner: A scanner is an input device that captures images from documents like prints, posters, papers etc. and transfers them in image format after scanning to your computer. Nowadays, even smartphones support applications that can act a scanner for them.

(viii) Bar Code Scanner: A barcode scanner/reader is an electronic device for reading printed barcodes. This finds its extensive use in shops where the cashier scans the barcode from the item and accordingly its description and price are displayed on the system for bill generation.

(ix) Kimball Tag Reader: Kimball tags are the small cards with holes in them. You can see them attached to clothes in some shops. When you buy the item, this tag is removed. They raise the sensor in case someone tries to move out without paying for them.

(x) Web cam: A webcam is an input device which captures a video image of the person/object in front of it. It is either built within the computer (e.g. laptop, tablet) or it is connected through port as an external device.

(xi) **Microphone:** A microphone (shortly known as mic) is an input device which captures the voice of the user. Once this voice passes through the microphone, it is transformed into signal (data) which the computer can process.

(xii) **Speech/Voice Recognition System:** Speech recognition is a technology that allows spoken input into computer systems. You talk to your computer and then it uses what you said as input to do some action accordingly. For example, a user could say "open internet" and the computer will open the internet browser.

(xiii) **Modem:** Modem is actually an input/output device. When a computer talks to another computer using a modem, it will send and receive digital information and data between the two computers. It travels on telephone line.

(xiv) **Light Pen:** The cursor on the screen can be moved by touching it with a light pen. They are mainly used for design work and need special software to run them.

(xv) **Digital Camera:** A digital camera is an input device which captures information (images) and stores it on the device via the memory card.

(xvi) **Magnetic Stripe reader and Magnetic Tape:** They are data capturing devices that read information via contact with a card carrying a magnetic strip and magnetic tape. The information read is accessed by the computer system.

(xvii) **Punched Cards:** A punch card is a simple piece of paper stock that can hold data in the form of small punched holes. They are positioned in such a way that can be read by computers or machines.

(xviii) **Magnetic Ink Character Recognition (MICR):** Magnetic ink characters are the numbers that you see at the bottom of bank cheques. The characters are printed using an ink which contains iron and may be magnetised. MICR devices read these magnetic characters.

(xix) **Optical Character Recognition (OCR):** OCR is the mechanical or electronic conversion of scanned images of typewritten or printed documents. When you have a scanned image containing text, you will find that OCR software will be able to extract text from them.

(xx) **Optical Mark Recognition (OMR):** Optical Mark readers are able to recognize the marks made on a special form in certain places. Common example of optical mark usage is examinations where you need to mark the correct answer by encircling the right option.

Output devices

An output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by the computer to the outside world. Output devices include the speaker, printer, monitor, plotter.

(i) **Printers:** Printer is the most important output device, which is used to print information on paper. There are two types of printers:

(a) **Impact Printers:** These printers print the characters by striking against the ribbon and onto the paper, are called impact printers. They consume less power, are very noisy but are useful for bulk printing due to low cost. There is physical contact with the paper to produce an image by these printers. These printers are of two types:

- **Character Printers:** Character Printers are printers, which print one character at a time. These are of further two types:
  - **Dot Matrix Printer (DMP):** One of the most popular printer is Dot Matrix Printer because of their ease with which they print features at economical price. Each character printed is in the form of pattern of dots which comes out to form a character that is why it is called Dot Matrix Printer.

- ❒ **Daisy Wheel:** These printers are generally used for word-processing in offices which require a few letters to be sent here and there with very nice quality representation. They are more reliable but noisy and more expensive than DMP's.

❖ **Line Printers:** Line printers are printers, which print one line at a time. These are of further two types:

- ❒ **Drum Printer:** This printer is like a drum in shape so it is called drum printer. The surface of drum is divided into number of tracks. One rotation of drum prints one line. Drum Printers are fast in speed and prints between 300 to 2000 lines per minute. They have very high speed but are very expensive.
- ❒ **Chain Printer:** In this printer, chains of character sets are used so it is called Chain Printers. Different languages can be used with the same printer. They are noisy and do not have the ability to print any shape of characters.

(b) Non-Impact Printers: The printers that print the characters without striking against the ribbon and on to the paper are called Non-impact Printers. These printers print a complete page at a time, also called as page printers. They are faster than impact printers, are not noisy and provide high quality prints. These printers are of two types:

❖ **Laser Printers:** These are non-impact page printers. They use laser lights to produce the dots needed to form the characters to be printed on a page. They work at very high speed and produce very high quality output and they are very expensive. They cannot be used to produce multiple copies of a document in a single printing.

❖ **Inkjet Printers:** Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features. Colour printing is also possible. Some models of Inkjet printers can produce multiple copies of printing.They are more reliable than laser printer though still expensive as cost per page is high and their speed is slow as compared to laser printer.

(ii) Speaker: A speaker allows you to hear the sound generated by your computer. It produces sound or music.

(iii) Headphones: Headphones is used to listen to music and sounds. It usually has a strap that rests on top of the head and a pair of speakers over both ears.

(iv)Monitors: Monitor also called Visual Display Unit (VDU) is the main output device of a computer. It forms images from tiny dots, called pixels. The sharpness of the image depends upon the number of pixels. There are two kinds of monitors:

(a) Cathode-Ray Tube (CRT) Monitor: In CRT monitors, display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity or resolution. Most screens are capable of displaying 80 characters of data horizontally and 25 lines vertically. It is large in size and high power is consumed by it.

(b) Flat-Panel Display Monitor: The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement compared to the CRT. LCD is a type of flat panel display. An LCD monitor is a thin, light computer monitor that displays images through the use of a liquid crystal display. LCD screens are found in most laptop computers as well as in flat panel monitors, and have replaced traditional cathode ray tube (CRT) monitors for many users.

(v) Graphics Plotter: The plotter is a computer printer for printing vector graphics. In the past, plotters were used in applications such as computer-aided design, though they have generally been replaced with wide-format conventional printers. A plotter gives a hard copy of the output. It draws pictures on paper using a pen.