

**COURSE ON  
COMPUTER  
CONCEPTS**

Abdullah Khan

Himalaya Publishing House

ISO 9001:2008 CERTIFIED

# COURSE ON COMPUTER CONCEPTS

---

---

(Syllabus of the Course on Computer Concepts (CCC) under the Scheme of  
AW India Council for Technical Education (AICTE) and Department of  
Information Technology (DIT), Ministry of Communication and Information  
Technology (MCIT), Govt. of India)



**Abdullah Khan**

*Associate Professor & Head,*  
Department of Computer Application,  
Institute of Environment and Management, Lucknow, U.P.



**Himalaya Publishing House**

MUMBAI • NEW DELHI • NAGPUR • BENGALURU • HYDERABAD • CHENNAI • PUNE • LUCKNOW  
• AHMEDABAD • ERNAKULAM • BHUBANESWAR • INDORE • KOLKATA • GUWAHATI

© **Author**

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording and/or otherwise without the prior written permission of the publisher.

**First Edition : 2015**

- 
- 
- Published by** : Mrs. Meena Pandey for **Himalaya Publishing House Pvt. Ltd.**,  
“Ramdoot”, Dr. Bhalerao Marg, Girgaon, Mumbai - 400 004.  
Phone: 022-23860170/23863863, Fax: 022-23877178  
**E-mail: himpub@vsnl.com; Website: www.himpub.com**
- Branch Offices** :
- New Delhi** : “Pooja Apartments”, 4-B, Murari Lal Street, Ansari Road, Darya Ganj,  
New Delhi - 110 002. Phone: 011-23270392, 23278631; Fax: 011-23256286
- Nagpur** : Kundanlal Chandak Industrial Estate, Ghat Road, Nagpur - 440 018.  
Phone: 0712-2738731, 3296733; Telefax: 0712-2721216
- Bengaluru** : No. 16/1 (Old 12/1), 1st Floor, Next to Hotel Highlands, Madhava Nagar, Race  
Course Road, Bengaluru - 560 001.  
Phone: 080-22286611, 22385461, 4113 8821, 22281541
- Hyderabad** : No. 3-4-184, Lingampally, Besides Raghavendra Swamy Matham, Kachiguda,  
Hyderabad - 500 027. Phone: 040-27560041, 27550139
- Chennai** : No. 8/2, Modley 2nd Street, Ground Floor, T. Nagar, Chennai - 600 017.  
Phone: 044-28144004/28144005; Mobile: 09345345051
- Pune** : First Floor, "Laksha" Apartment, No. 527, Mehunpura, Shaniwarpath  
(Near Prabhat Theatre), Pune - 411 030. Phone: 020-24496323/24496333;  
Mobile: 09370579333
- Lucknow** : House No 731, Shekhupura Colony, Near B.D. Convent School, Aliganj,  
Lucknow - 226 022. Phone: 0522-4012353; Mobile: 09307501549
- Ahmedabad** : 114, “SHAIL”, 1st Floor, Opp. Madhu Sudan House, C.G. Road, Navrang Pura,  
Ahmedabad - 380 009. Phone: 079-26560126; Mobile: 09377088847
- Ernakulam** : 39/104 A, Lakshmi Apartment, Karikkamuri Cross Rd., Ernakulam,  
Cochin - 622011, Kerala. Phone: 0484-2378012, 2378016; Mobile: 09387122121
- Bhubaneswar** : 5 Station Square, Bhubaneswar - 751 001 (Odisha).  
Phone: 0674-2532129, Mobile: 09338746007
- Indore** : Kesardeep Avenue Extension, 73, Narayan Bagh, Flat No. 302, 3rd Floor,  
Near Humpty Dumpty School, Indore - 452 007 (M.P.). Mobile: 09303399304
- Kolkata** : 108/4, Beliaghata Main Road, Near ID Hospital, Opp. SBI Bank,  
Kolkata - 700 010, Phone: 033-32449649, Mobile: 7439040301
- Guwahati** : House No. 15, Behind Pragjyotish College, Near Sharma Printing Press,  
P.O. Bharalumukh, Guwahati - 781009, (Assam).  
Mobile: 09883055590, 08486355289, 7439040301
- DTP by** : Smt. Shailaja S. Kadam
- Printed at** : M/s. Aditya Offset Process (I) Pvt. Ltd., Hyderabad. On behalf of HPH.

## **Dedication**

This book is dedicated to  
my kids, Ammar, and Azka Khan,  
who are just about the best children  
a Dad could hope for;  
happy, loving, and fun to be with.  
Fundamentally what I love to do is create,  
so it's wonderful watching you grow!

# Preface

Today's world is an information-rich world and it has become a necessity for everyone to know about computers. The purpose of this book is to introduce you about computer and its fundamentals. Computers have touched every part of our lives: the way we work, the way we learn, the way we live, even the way we play. It almost is impossible to go through a single day without encountering a computer, a device dependent on a computer, information produced by a computer, or a word that was introduced or whose meaning has changed with the advent of computers. Because of the significance of computers in today's world, it is important to be computer literate. Being **computer literate** means you have knowledge and understanding of computers and their uses.

## Computer

A computer is a powerful tool because it is able to perform the information processing cycle operations (input, process, output, and storage) with amazing speed, reliability, and accuracy; store huge amounts of data and information; and communicate with other computers. Computers allow users to generate correct information quickly, hold the information so it is available at any time, and share the information with other computer users.

## Computer Literacy

It is difficult to think of a field in which computers are *not* used. In addition to general-purpose computers, special-purpose computers are used in everything from automobiles to electric razors. Consider how computers have influenced our daily lives, both positively and negatively. ("To err is human, but to really foul things up requires a computer." – Anonymous, from a BBC Radio broadcast.) List ways in which computers are being used today. What is the most common use? What is the most unusual use? As a result of the expanding use of computers in 1986, Florida became the first state to demand computer literacy of all students by grade 12.

## Types of Software

There are two categories of computer software: system software and application software. **System software** consists of the programs that control the operations of a computer and its devices. Two types of system software are the operating system and utility programs. An **operating system (OS)** coordinates all the activities among hardware devices and contains instructions that allow you to run application software. A **utility program** performs specific tasks, usually related to managing a computer, its devices, or its programs. You interact with software through its user interface.

**Application software** consists of programs that perform specific tasks for users. Popular application software includes word processing software, spreadsheet software, database software, and presentation graphics software. Application software can be **packaged software** (copyrighted software that meets the needs of a variety of users), **custom software** (tailor-made software developed at a user's request), **freeware** (copyrighted software provided at no cost), **public-domain software** (software donated for public use with no copyright restrictions), or **shareware** (copyrighted software distributed free for a trial period).

## Internet and the World Wide Web

The world's largest network is the **Internet**, which is a worldwide collection of networks that links together millions of businesses, government agencies, educational institutions, and individuals. Users connect to the Internet to send messages, access information, shop for goods and services, meet or

converse with other users, and access sources of entertainment and leisure. Most users connect to the Internet through an Internet service provider (ISP) or an online service provider (OSP). The World Wide Web is a popular segment of the Internet that contains billions of documents called Web pages. These documents can contain text, graphics, sound, video, and built-in connections, or links, to other Web pages stored on computers throughout the world.

## Categories of Computers and their Uses

The six major categories of computers are personal computers, handheld computers, Internet appliances, mid-range servers, mainframes, and supercomputers. These categories are based on differences in size, speed, processing capabilities, and price. A **personal computer** can perform all of its input, processing, output, and storage activities by itself. Personal computers include desktop computers and notebook computers. A **desktop computer** is designed so that the system unit, input devices, output devices, and any other devices fit entirely on or under a desk or table. Variations of desktop computers include **tower models** (computers with tall and narrow system units that can sit vertically on the floor), **all-in-one computers** (less expensive computers that combine the monitor and system unit into a single device), and **workstations** (more expensive and powerful computers designed for work that requires intense calculation and graphics capabilities).

A **notebook computer** is a portable personal computer small enough to fit on your lap. Notebook and desktop computers are used at home or in the office to perform application software-related tasks or to access the Internet. A **handheld computer** is a small computer that fits in your hand. Handheld computers can perform specific, industry-related functions, or can be general-purpose.

A **PDA (personal digital assistant)** is a handheld computer that provides personal organizer functions, such as a calendar, appointment book, and notepad. An **Internet appliance** is a computer with limited functionality whose main purpose is to connect to the Internet from home. A **mid-range server** is more powerful and larger than a workstation computer. Users typically access a mid-range server through a personal computer or a **terminal**, which is a device with a monitor and a keyboard that usually has no stand-alone processing power.

A **mainframe** is a large, expensive, very powerful computer that can handle hundreds or thousands of connected users simultaneously. A **supercomputer** is the fastest, most powerful, and most expensive category of computer.

## Various Types of Computer Users

Computer users can be divided into five categories: home user, small office/home office users, mobile users, large business users, and power users. A **home user** spends time on the computer for personal and business communications, budgeting and personal financial management, entertainment, and Web access. A **small office/home office (SOHO)** user includes any company with fewer than 50 employees, as well as self-employed people that work out of their home. A **mobile user** travels to and from a main office or school to conduct business, communicate, or do homework. A **large business user** works for a company that has a large number of employees and computers usually connected to a network. The **power user** – such as an engineer, architect, or desktop publisher – typically works with **multimedia**, which combines several media elements into one application, and requires the capabilities of a workstation or other powerful computer.

**Abdullah Khan**

# Acknowledgments

First and foremost, I would like to thank God. In the process of putting this book together, I realized how true this gift of writing is for me. You gave me the power to believe in my passion and pursue my dreams. I could never have done this without the faith I have in you, the Almighty. In addition, I would like to thank my parents for standing beside me throughout my career and writing this book. She has been my inspiration and motivation for continuing to improve my knowledge and move my career forward. I also thank my wonderful children: Ammar, and Azka Khan, for always making me smile and for understanding on those weekend mornings when I was writing this book instead of playing games. I hope that one day they can read this book and understand why I spent so much time in front of my computer. I'd like to thank my family, including my wife for always supporting me throughout my career and authoring this book and I really appreciate it.

Last, but definitely not least, I beg forgiveness of all those who have been with me over the course of the years and whose names I have failed to mention.

**Abdullah Khan**

# Syllabus

		Theory	Tutorials	Practical
1	Introduction to Computer	2	1	4
2	Introduction to GUI-based Operating System	3	–	8
3	Elements of Word Processing	4	2	10
4	Spreadsheets	4	2	10
5	Computer Communication and Internet	4	–	5
6	WWW and Web Browsers	2	–	3
7	Communication and Collaboration	2	–	2
8	Making Small Presentations	4	–	8
	<b>Grand Total</b>	<b>25</b>	<b>5</b>	<b>50</b>

# Contents

<b>1.</b>	<b>Introduction to Computer</b>	<b>1 - 19</b>
<b>2.</b>	<b>Introduction to GUI-based Operating System</b>	<b>20 - 33</b>
<b>3.</b>	<b>Elements of Word Processing</b>	<b>34 - 64</b>
<b>4.</b>	<b>Introduction to Excel</b>	<b>65 - 93</b>
<b>5.</b>	<b>Computer Communication and Internet</b>	<b>94 - 108</b>
<b>6.</b>	<b>WWW and Web Browser</b>	<b>109 - 125</b>
<b>7.</b>	<b>Communication and Collaboration</b>	<b>126 - 137</b>
<b>8.</b>	<b>Making Small Presentations</b>	<b>138 - 154</b>
<b>9.</b>	<b>Model Question Papers</b>	
	<b>Set No. 1</b>	<b>155 - 162</b>
	<b>Set No. 2</b>	<b>163 - 170</b>
	<b>Set No. 3</b>	<b>171 - 178</b>
	<b>Set No. 4</b>	<b>179 - 185</b>
	<b>Set No. 5</b>	<b>186 - 192</b>



# Introduction to Computer

---

---

## Structure

- 1.1 Introduction
  - 1.1.1 Objective
- 1.2 What is Computer?
  - 1.2.1 Characteristics of Computer
- 1.3 Evolution of Computers
  - 1.3.1 The First Computer
  - 1.3.2 Some Well Known Early Computers
  - 1.3.3 Computer Generations
- 1.4 Components of a Computer
- 1.5 Hardware vs Software
- 1.6 System vs Application Software
- 1.7 Bits and Bytes
- 1.8 Input and Output Devices
  - 1.8.1 Input Devices
  - 1.8.2 Output Devices
- 1.9 RAM/ROM
- 1.10 Secondary Storage Devices
- 1.11 Summary
- 1.12 Answers to SAQs

### 1.1 INTRODUCTION

This unit aims at introducing you to today's most commonly used electronic device – the **computer**. The study of this unit will highlight the characteristics and evolution of computers. It will also help you to understand the basic terminology associated with computers.

#### 1.1.1 Objective

After studying this unit, you should be able to

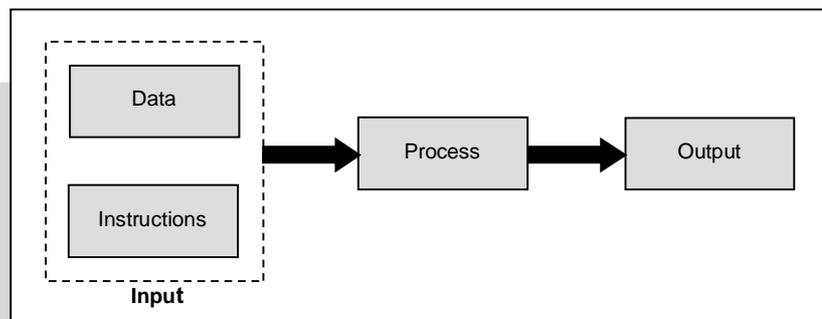
- ◆ understand the basic characteristics of computers.
- ◆ understand how the computers evolved.
- ◆ understand the components that make up a computer.
- ◆ differentiate between hardware and software.

- ◆ differentiate between system and application software.
- ◆ understand the difference between bits and bytes.
- ◆ classify devices as input and output devices.
- ◆ differentiate between ROM and RAM.
- ◆ appreciate the use of various secondary storage devices.

## 1.2. WHAT IS COMPUTER?

The word 'Computer' literally means to 'Compute' or to 'Calculate'. Stated simply, it is an electronic device which processes information based on the instructions provided, to generate the desired output. It, therefore, requires two types of input – raw data, and the set of instructions to process or act upon the data.

This can be schematically be shown in Figure 1.1



**Figure 1.1 : Processing Information**

Data can be of any type – text, numeric, alphanumeric, image, picture, sound, etc. The instructions that act upon this data are also called the **program** or **software** in computer terminology.

### 1.2.1 Characteristics of Computer

The characteristics of computer that have made them so powerful and universally useful are speed, accuracy, diligence, versatility and storage capacity.

**Speed:** Computer work at an incredible speed. The speed with which it performs is way beyond human capabilities. As a comparison, it can do in one minute what a human being would probably take a lifetime!

When we refer to the speed of computer, we now talk in terms of milliseconds (hundredth of a second), microseconds (millionth of a second), nanoseconds (billionth of a second), and even picoseconds (trillionth of a second). A powerful computer is capable of performing about 3-4 million simple instructions per second.

**Accuracy:** In addition to being fast, computers are also accurate. Errors that may occur can almost always be attributed to human error (inaccurate data, poorly designed system or faulty instructions/programs written by the programmer) rather than technological weaknesses. In fact, a special term GIGO (Garbage In Garbage Out) has been coined to represent a scenario where faulty results are got due to inaccurate instructions or faulty data.

**Diligence:** Unlike human beings, computers are highly consistent. They do not suffer from human traits of boredom and tiredness resulting in lack of concentration. Computers, therefore, score high over human beings in performing voluminous and repetitive jobs.

**Versatility:** Computers are versatile machines and are capable of performing any task as long as it can be broken down into a series of logical steps. This means that their capability is, once again, limited only by human intelligence. As is evident, in today's fast developing technology-world, it is almost inconceivable to find an area where computers are not being used. The presence of computers can be seen in every sphere – Railway/Air reservation, Banks, Hotels, Weather forecasting and many more.

**Storage Capacity:** Today's computers can store volumes of data. Unlike human memory where unimportant information is relegated to the back of the mind and forgotten as time progresses, a piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously! Information can, therefore, be retained as long as desired (using secondary storage – a type of detachable memory).

**SAQ 1 :** *Identify the characteristics of a computer that have contributed towards making it such a popular device.*

### 1.3 EVOLUTION OF COMPUTERS

The history of computers can be traced back to almost 2000 years ago, with the advent of **abacus**, a wooden rack holding two horizontal wires with beads strung on them. Numbers are represented using the position of beads on the rack. Fast and simple calculations can be carried out by appropriately placing the beads.

In 1620, an English mathematician by the name **William Oughtred** invented the slide rule – a calculating device based on the principle of logarithms. It consisted of two graduated scales devised in such a manner that suitable alignment of one scale against the other, made it possible to perform additions, compute products etc. just by inspection.

**Blaise Pascal**, a French mathematician, is usually credited for building the first digital computer in 1642. He invented the mechanical calculating machine. Numbers were entered in this machine by dialing a series of numbered wheels. Another series of toothed wheels transferred the movements to a dial, which showed the results.

In 1671, **Gottfried von Leibnitz**, a German mathematician, invented a calculating machine which was able to add and perform multiplications. He invented a special **stepped gear** mechanism for introducing the addend digits, which is still being used.

The prototypes made by **Pascal** and **Leibnitz** were not used in many places. It was only about a century later that **Thomas of Colmar** created the first successful mechanical calculator which could add, subtract, multiply, and divide. A lot of improved desktop calculators by various inventors followed, such that by 1890, a range of improvements like accumulation of partial results, storage of past results, and printing of results were not uncommon.

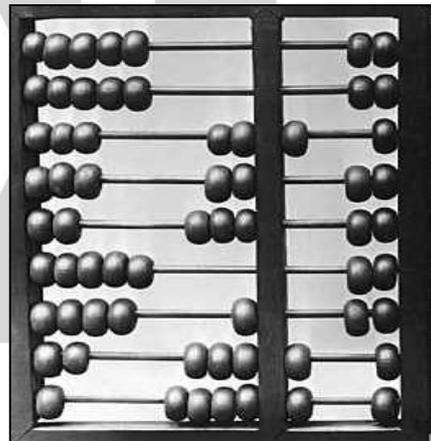


Figure 1.2 : The Abacus

### 1.3.1 The First Computer

*Charles Babbage*, a professor of mathematics at Cambridge University, England, realized that many long calculations usually consisted of a series of actions that were constantly repeated and hence could possibly be automated. By 1822, he designed an automatic calculating machine that he called the '**Difference Engine**'. It was intended to be steam powered and fully automatic (including printing of result tables), commanded by a fixed instruction program. In short, he developed a prototype of a computer which was 100 years ahead of time and is, therefore, considered as the **father of modern day computers**.

A step towards automated computing was the development of punched cards which were first successfully used by *Herman Hollerith*, who worked in the US Census Bureau in 1890. He along with *James Powers* developed devices that could read information that had been punched into cards, without any human help. This resulted in reduced reading errors, increased workflow and availability of unlimited memory (punched cards could be used as easily accessible memory of unlimited size).

These advantages were seen by various commercial companies and soon led to the development of improved punch-card using computers by companies like International Business Machines (IBM) and Remington.

### 1.3.2 Some Well Known Early Computers

**Mark I** : After World War II there was a need felt for advanced calculations. By that time, many reliable mechanical desk calculators had been developed. *Howard A. Aiken* of Harvard University, while working on his doctorate in physics, in the year 1937, designed a machine that could automatically perform a sequence of arithmetic operations. He completed this in 1944 and named it **Mark I**. This machine performed a multiplication and division at an average of about four and eleven seconds respectively. The results were printed at a rate of one result per five seconds.

**ENIAC** : The World War II also produced a large need for computer capacity especially for the military. New weapons were made for which trajectory tables and other essential data were needed. In 1942, Professors *John P. Eckert* and *John W. Mauchly* at the Moore School of Engineering of the University of Pennsylvania, USA, decided to build a high speed computer to do the job. This was called the Electronic Numeric Integrator and Calculator (ENIAC).

It used 18,000 vacuum tubes, about 1,800 square feet of floor space, and consumed about 180,000 watts of electrical power. It had punched cards I/O and its programs were wired on boards.

ENIAC is accepted as the first successful high-speed electronic digital computer and was used from 1946 to 1955.

**EDVAC** : Fascinated by the success of ENIAC, *John Von Neumann*, a mathematician, undertook an abstract study of computation in 1945. In this he aimed to show that a computer should be able to execute any kind of computation by means of a proper programmed control. His ideas, referred to as '**stored program technique**', became essential for future generations of high-speed digital computers and were universally accepted. The basic idea behind the stored program concept was that data as well as instructions can be stored in the computer's memory to enable automatic flow of operations.

Between 1947 and 1950, the Moore School personnel and the Ballistics Research Laboratory of the US army built a computer named Electronic Discrete Variable Automatic Computer (EDVAC), which was based on Von Neumann's concept of stored program.

**UNIVAC** : The Universal Automatic Computer (UNIVAC), developed in 1951, was the first digital computer to be produced and was installed in the Census Bureau.

The first-generation stored-program computers needed a lot of maintenance, reached 70% to 80% reliability of operations and were used for almost 10 years. EDVAC and UNIVAC fell into this group of computers and were the first commercially available computers.

### 1.3.3 Computer Generations

'Generation' in computer terminology is a 'step' ahead in technology. As you go through the history of evolution of computers, you will find that the earliest computers were big in size, consumed a lot of power and heated up quickly, due to which it had to be shut down, frequently to be cooled. They were very expensive in terms of development and maintenance.

As technology improved, computers became compact, faster and more powerful. From a user's perspective, they become user-friendly and more affordable. This has largely contributed towards the popularity that computers have gained these days.

The term 'generation' was earlier used only to distinguish between varying hardware technologies but was later extended to include both hardware and software. A comparison of generations is made below.

#### First Generation Computer (1940 to 1956)

The first generation of computers was characterized by vacuum tubes in the circuitry and magnetic drums for memory. These computers were enormous in size, used great deal of electricity and were expensive to operate. They also had limited storage capacity.

First generation computers relied on machine language (binary-coded program) to perform operations and could solve only one problem at a time. Punched cards and paper tapes were used to input data and instructions, and output was displayed on printouts.

Early computers like ENIAC, EDVAC and UNIVAC can all be classified as first generation computers.

#### Second Generation Computer (1956 to 1963)

In the early 1950s, the discoveries of **Transistor** and **Magnetic core** memory changed the image of computers – from unreliable to highly reliable machines with increased capability, and higher storage capacity.

The transistor was far superior to the vacuum tube, allowing computers to become smaller in size, cheaper, reliable and more energy efficient. Though transistor still generated a great deal of heat, it was a substantial improvement over the vacuum tube.



**Figure 1.3 : Vacuum Tube**

Second generation of computers was also characterized by allowing programmers to specify instructions in symbolic (or assembly) language rather than cryptic binary machine language. High level programming languages like **Common Business Oriented Language (COBOL)** and **FORMula TRANslation (FORTRAN)** were also being developed at this time.

Due to the increase in the cost of expanding programming, these machines were expensive to purchase and operate. Such computers were, therefore, mostly found in large computer centres or government/private laboratories with many programmers and support professionals.

### Third Generation Computer (1964 to 1971)

The development of **Integrated Circuit** by *Jack Kilby*, an engineer with Texas Instruments, in 1958, was the hallmark of the third generation of computers. Punched cards and printouts gave way to devices like keyboards and monitors making it easier for the user to interact with the computer. Computer manufacturers could provide a range of accessories like the cathode ray tube display devices, page printers, consoles, etc. Existence of an **operating system** allowed the device to run various applications at one time with the central program monitoring the memory.

For the first time, computers were being widely used in business for areas like :

- ◆ Accounting
- ◆ Payroll
- ◆ Billing
- ◆ Tracking Inventory, etc.

Third generation computers were substantially smaller and cheaper than their predecessors.

### Fourth Generation Computer (1971 to present)

The trend in 1970s, was to move from single-purpose but powerful computers towards cheaper computer systems that could support a large range of applications.

A new revolution in computer hardware came about which could shrink the computer logic circuitry and its components using the Large Scale Integration (LSI) technology. Hundreds of components could now fit onto a single chip!

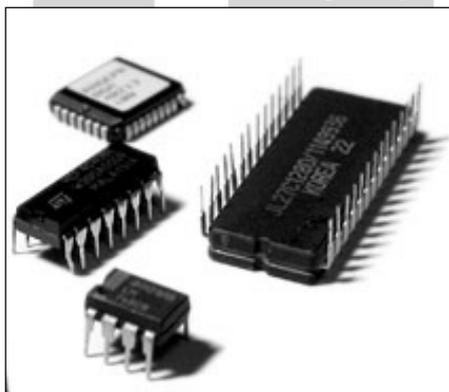


Figure 1.4 : IC Chips



Figure 1.5 : Intel Pentium Microprocessor Chip

In the 1980s, Very Large Scale Integration (VLSI) squeezed hundreds of thousands of components onto a single chip. This shrinking trend continued and led to the introduction of personal computers (PCs) – programmable machines that are small enough and inexpensive so that these can be

purchased and used by individuals. Companies like Apple Computers and IBM introduced very successful PCs.

The IC technology was not only used to construct the processor, but also for the construction of memory. The first memory chip was constructed in 1970 and could hold 256 bits.

### Fifth Generation Computer (the Road Ahead)

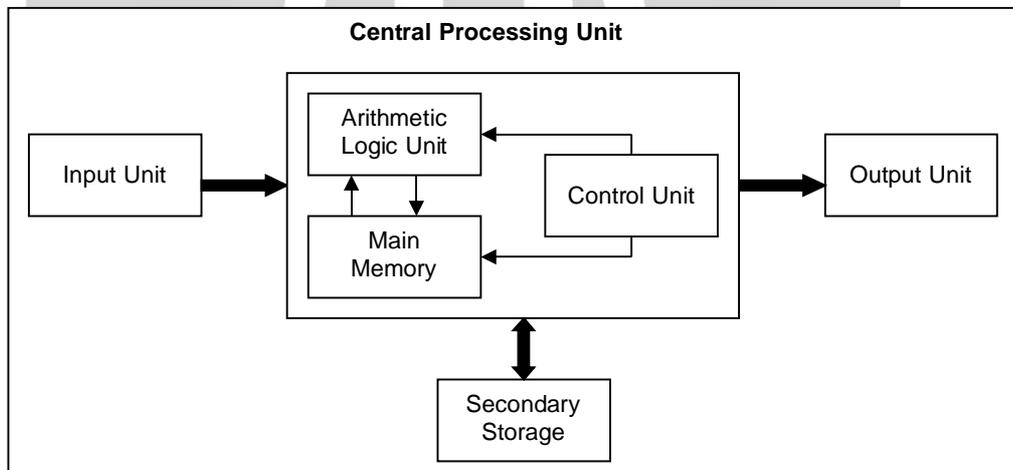
The fifth generation of computers characterized by artificial intelligence is in the process of development. The goal here is to develop devices that are capable of learning and responding to natural language input. This generation of computers is using new technologies in very large scale integration, along with new programming languages and will be capable of amazing feats, in the area of artificial intelligence, such as voice recognition.

**SAQ 2 :** *What unique features classify computers into different generations?*

## 1.4 COMPONENTS OF A COMPUTER

The computer system essentially comprises three important parts – input device, central processing unit (CPU) and the output device. The CPU itself is made of three components namely, the arithmetic logic unit (ALU), memory unit, and the control unit.

In addition to these, auxiliary storage/secondary storage devices are used to store data and instructions on a long-term basis.



**Figure 1.6 : Schematic Representation of a Computer**

**Input Unit:** Data and instructions must be entered into the computer system for processing, and results obtained from computations must be displayed or recorded for the user. The input device serves the purpose of receiving data and instructions in a form that can be understood by the computer.

**Central Processing Unit:** Data and instructions (programs) are stored in the computer's memory after which all the major calculations and computations are carried out within the CPU. The CPU is also responsible for controlling the operations of various units of the computer system.

**Arithmetic Logic Unit (ALU):** All calculations and comparisons, based on the instructions provided, are carried out within the ALU. It performs arithmetic functions like addition, subtraction, multiplication, division and also logical operations like greater than, less than and equal to.

**Main Memory:** The main memory holds data and instructions after input, till they are needed. It also holds the processed results that are awaiting output.

**Control:** The function of the control unit is to execute the instructions of a program, one by one, in the desired sequence. It interprets each instruction and then prompts its execution by one of the units like input, output, ALU, storage.

For example, a comparison of two numbers (a logical operation) to be performed by the ALU may require loading the two numbers into the main memory which is a function performed by the control unit. It will then pass on the execution of the 'compare' function to the ALU.

**Output Unit:** The processed data, stored in the memory of the computer is sent to the output unit, which then converts it into a form that can be understood by the user. The output is usually produced in one of the two ways – on the display device, or on paper (hard copy).

**Secondary Storage:** Also termed as 'auxiliary' or 'backup' storage, it is typically used as a supplement to main storage. It is much cheaper than the main storage and stores large amount of data and instructions permanently. Hardware devices like magnetic tapes and disks fall under this category.

**SAQ 3 : What are the basic components of a computer system?**

## 1.5 Hardware vs Software

The electrical, electronic, mechanical and magnetic components that make up the computer system are together termed as '**hardware**'. These include components that are responsible for user input, display and mathematical processing. The CPU, disk drives, internal chips and wiring, modem, peripheral devices like the monitor, keyboard, mouse, printer, speakers, etc., are together termed as computer hardware.

Computer hardware cannot perform any manipulation or calculation without being instructed as to what to do and how to do it. Programs (or instructions) are required to tell the computer what to do. The generic term for computer programs is '**software**'. Software comes in two main types – system software and program.

## 1.6 SYSTEM vs APPLICATION SOFTWARE

System software consists of programs that control the operations of the computer system itself. It consists of a group of programs that control the operations of a computer equipment including functions like managing memory, managing peripherals, loading, storing, and is an interface between the application programs and the computer. MS DOS (Microsoft's Disk Operating System), UNIX are examples of system software.

Software that can perform a specific task for the user, such as word processing, accounting, budgeting or payroll, fall under the category of application software. Such programs run on top of an operating system (like Windows, UNIX, Linux, Macintosh) and are used to carry out specific

functions. Word processors, spreadsheets, database management systems are all examples of general purpose.

## 1.7 BITS AND BYTES

All information in the computer is handled using electrical components like the integrated circuits, semiconductors, all of which can recognize only two states – presence or absence of an electrical signal. Two symbols used to represent these two states are **0** and **1**, and are known as BITS (an abbreviation for **BI**nary **Digi**TS). **0** represents the absence of a signal, **1** represents the presence of a signal. A BIT is, therefore, the smallest unit of data in a computer and can either store a **0** or **1**.

Since a single bit can store only one of the two values, there can possibly be only four unique combinations :

**00    01    10    11**

Bits are, therefore, combined together into larger units in order to hold greater range of values.

BYTES are typically a sequence of eight bits put together to create a single computer alphabetical or numerical character. More often referred to in larger multiples, bytes may appear as Kilobytes (1,024 bytes), Megabytes (1,048,576 bytes), Giga Bytes (1,073,741,824), Terabytes (approx. 1,099,511,000,000 bytes), or Petabytes (approx. 1,125,899,900,000,000 bytes).

Bytes are used to quantify the amount of data digitally stored (on disks, tapes) or transmitted (over the internet), and are also used to measure the memory and document size.

### SAQ 4 : TRUE or FALSE

- (a) *All code or data is stored and processed in computers using two symbols - 0 and 1.*  
 (b) *A 'Byte' is a group of four bits and is often used to store characters.*

## 1.8 INPUT AND OUTPUT DEVICES

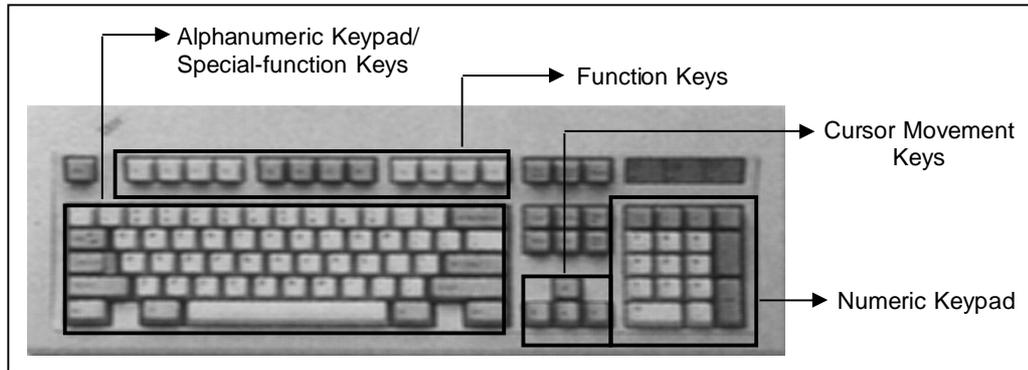
The computer will be of no use unless it is able to communicate with the outside world. Input/Output devices are required for users to communicate with the computer. In simple terms, input devices bring information INTO the computer and output devices bring information OUT of a computer system. These input/output devices are also known as peripherals since they surround the CPU and memory of a computer system.

Some commonly used Input/Output devices are listed in table below.

Input Devices	Output Devices
Keyboard	Monitor
Mouse	LCD
Joystick	Printer
Scanner	Plotter
Light Pen	
Touch Screen	

## 1.8.1 Input Devices

**Keyboard :** It is a text base input device that allows the user to input alphabets, numbers and other characters. It consists of a set of keys mounted on a board.



**Figure 1.7 : Qwerty Keyboard Layout**

**Alphanumeric Keypad :** It consists of keys for English alphabets, 0 to 9 numbers, and special characters like + ( / \* ( ) etc.

**Function Keys :** There are twelve function keys labeled F1, F2, F3, ... , F12. The functions assigned to these keys differ from one software package to another. These keys are also user programmable keys.

**Special-function Keys :** These keys have special functions assigned to them and can be used only for those specific purposes. Functions of some of the important keys are defined below.

**Enter :** It is similar to the 'return' key of the typewriter and is used to execute a command or program.

**Spacebar :** It is used to enter a space at the current cursor location.

**Backspace :** This key is used to move the cursor one position to the left and also delete the character in that position.

**Delete :** It is used to delete the character at the cursor position.

**Insert :** Insert key is used to toggle between insert and overwrite mode during data entry.

**Shift :** This key is used to type capital letters when pressed along with an alphabet key. Also used to type the special characters located on the upper-side of a key that has two characters defined on the same key.

**Cap Lock :** Cap Lock is used to toggle between the capital lock feature. When 'on', it locks the alphanumeric keypad for capital letters input only.

**Tab :** Tab is used to move the cursor to the next tab position defined in the document. Also, it is used to insert indentation into a document.

- Ctrl :** Control key is used in conjunction with other keys to provide additional functionality on the keyboard.
- Alt :** Also like the control key, Alt key is always used in combination with other keys to perform specific tasks.
- Esc :** This key is usually used to negate a command. Also used to cancel or abort executing programs.

**Numeric Keypad :** Numeric keypad is located on the right side of the keyboard and consists of keys having numbers (0 to 9) and mathematical operators (+ ( \* /) defined on them. This keypad is provided to support quick entry for numeric data.

**Cursor Movement Keys :** These are arrow keys and are used to move the cursor in the direction indicated by the arrow (up, down, left, right).

**Mouse :** The mouse is a small device used to point to a particular place on the screen and select in order to perform one or more actions. It can be used to select menu commands, size windows, start programs, etc. The most conventional kind of mouse has two buttons on top: the left one being used most frequently.



Figure 1.8 : Mouse

**Mouse Actions :**

- Left Click :** Used to select an item.
- Double Click :** Used to start a program or open a file.
- Right Click :** Usually used to display a set of commands.

**Drag and Drop :** It allows you to select and move an item from one location to another. To achieve this place the cursor over an item on the screen, click the left mouse button and while holding the button down move the cursor to where you want to place the item, and then release it.

**Joystick :** The joystick is a vertical stick which moves the graphic cursor in a direction the stick is moved. It typically has a button on top that is used to select the option pointed by the cursor. Joystick is used as an input device primarily used with video games, training simulators and controlling robots.



Figure 1.9 : Joystick

**Scanner :** Scanner is an input device used for direct data entry from the source document into the computer system. It converts the document image into digital form so that it can be fed into the computer. Capturing information like this reduces the possibility of errors typically experienced during large data entry.



Figure 1.10 : A Flat-Bed Scanner

**Light Pen :** It is a pen shaped device used to select objects on a display screen. It is quite like the mouse (in its functionality) but uses a light pen to move the pointer and select any object on the screen by pointing to the object.

Users of Computer Aided Design (CAD) applications commonly use the light pens to directly draw on screen.

**Touch Screen :** It allows the user to operate/make selections by simply touching the display screen. Common examples of touch screen include information kiosks, and bank ATMs.

## 1.8.2 Output Devices

**Monitor :** Monitor is an output device that resembles the television screen and uses a Cathode Ray Tube (CRT) to display information. The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in. It also displays the program or application output. Like the television, monitors are also available in different sizes.



Figure 1.11 : Monitor

**Liquid Crystal Display (LCD) :** LCD was introduced in the 1970s and is now applied to display terminals also. Its advantages like low energy consumption, smaller and lighter have paved its way for usage in portable computers (laptops).

**Printer :** Printers are used to produce paper (commonly known as hardcopy) output. Based on the technology used, they can be classified as **Impact** or **Non-impact** printers.

Impact printers use the typewriting printing mechanism wherein a hammer strikes the paper through a ribbon in order to produce output. Dot-matrix and Character printers fall under this category.



Figure 1.12 : An Ink Printer

**Non-impact** printers do not touch the paper while printing. They use chemical, heat or electrical signals to etch the symbols on paper. Inkjet, Deskjet, Laser, Thermal printers fall under this category of printers.

When we talk about printers we refer to two basic qualities associated with printers: resolution, and speed. **Print resolution** is measured in terms of number of dots per inch (dpi). **Print speed** is measured in terms of number of characters printed in a unit of time and is represented as characters-per-second (cps), lines-per-minute (lpm), or pages-per-minute (ppm).

**Plotter :** Plotters are used to print graphical output on paper. It interprets computer commands and makes line drawings on paper using multicoloured automated pens. It is capable of producing graphs, drawings, charts, maps, etc.

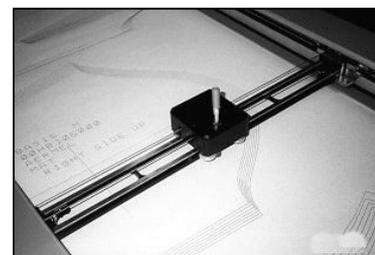


Figure 1.13 : A Flatbed Plotter

Computer Aided Engineering (CAE) applications like CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) are typical usage areas for plotters.

## 1.9 RAM/ROM

Computer's memory can be classified into two types – RAM and ROM.

**RAM** or Random Access Memory is the central storage unit in a computer system. It is the place in a computer where the operating system, application programs and the data in current use are kept temporarily so that they can be accessed by the computer's processor. The more RAM a computer has, the more data a computer can manipulate.

Random access memory, also called the Read/Write memory, is the temporary memory of a computer. It is said to be 'volatile' since its contents are accessible only as long as the computer is on. The contents of RAM are cleared once the computer is turned off.

**ROM** or Read Only Memory is a special type of memory which can only be read and contents of which are not lost even when the computer is switched off. It typically contains manufacturer's instructions. Among other things, ROM also stores an initial program called the 'bootstrap loader' whose function is to start the computer software operating, once the power is turned on.

Read-only memories can be **manufacturer-programmed** or **user-programmed**. While manufacturer-programmed ROMs have data burnt into the circuitry, user-programmed ROMs can have the user load and then store read-only programs. PROM or Programmable ROM is the name given to such ROMs.

Information once stored on the ROM or PROM chip cannot be altered. However, another type of memory called EPROM (Erasable PROM) allows a user to erase the information stored on the chip and reprogram it with new information. EEPROM (Electrically EPROM) and UVEPROM (Ultra Violet EPROM) are two types of EPROMs.

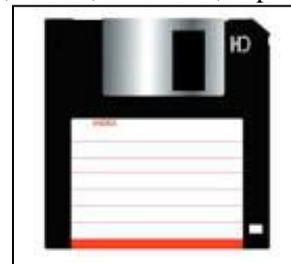
**SAQ 5 : Differentiate between RAM and ROM.**

## 1.10 SECONDARY STORAGE DEVICES

RAM is volatile memory having a limited storage capacity. Secondary/auxiliary storage is storage other than the RAM. These include devices that are peripheral and are connected and controlled by the computer to enable permanent storage of programs and data.

Magnetic medium was found to be fairly inexpensive and long lasting medium and, therefore, became the preferred choice for auxiliary storage. Floppy disks and hard disks fall under this category. The newer forms of storage devices are optical storage devices like CDs, DVDs, Pen drive, Zip drive etc.

**Floppy Disk :** These are small removable disks that are plastic coated with magnetic recording material. Floppy disks are typically 3.5 (in size (diameter) and can hold 1.44 MB of data. This portable storage device is a rewritable media and can be reused a number of times.



**Figure 1.14 : A Floppy Disk**

Floppy disks are commonly used to move files between different computers. The main disadvantage of floppy disks is that they can be damaged easily and, therefore, are not very reliable.

**Hard Disk :** Hard disks are made up of rigid material and are usually a stack of metal disks sealed in a box. The hard disk and the hard disk drive exist together as a unit and are a permanent part of the computer where data and programs are saved. These disks have storage capacities ranging from 1GB to 80 GB and more. Hard disks are also rewritable and are more reliable when compared with floppies.

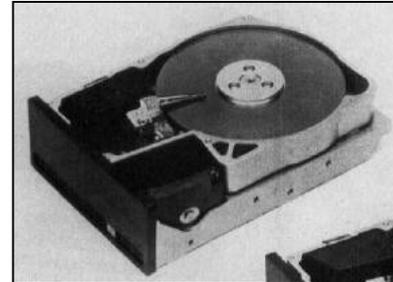


Figure 1.15 : A Winchester Disk

Depending on the way they are packaged, hard disks can be classified as **Disk packs** or **Winchester disks**. Disk packs are removable, in the sense that they can be removed and kept offline when not in use. They must be mounted on the disk drive before use. Winchester disks on the other hand, consist of disk platters sealed in a contamination-free container and form a permanent component of the computer.

**CD :** Compact Disk (CD) is portable disk having data storage capacity between 650-700 MB. It can hold large amount of information such as music, full-motion videos, and text etc. It contains digital information that can be read, but cannot be rewritten. Separate drives exist for reading and writing CDs.

Since it is a very reliable storage media, it is very often used as a medium for distributing large amount of information to large number of users. In fact today most of the software is distributed through CDs.

**DVD :** Digital Versatile Disk (DVD) is similar to a CD but has larger storage capacity and enormous clarity. Depending upon the disk type it can store several Gigabytes of data (as opposed to around 650MB of a CD). DVDs are primarily used to store music or movies and can be played back on your television or the computer too. They are not rewritable media.

## Multimedia

The use of computers to present text, graphics, video, animation, and sound in an integrated way. Long touted as the future revolution in computing, multimedia applications were, until the mid-90s, uncommon due to the expensive hardware required. With increases in performance and decreases in price, however, multimedia is now commonplace. Nearly all PCs are capable of displaying video, though the resolution available depends on the power of the computer's video adapter and CPU.

### What is e-Governance?

It is the use of a range of modern Information and Communication Technologies such as Internet, Local Area Networks, mobiles, etc., by Government to improve the effectiveness, efficiency, service delivery and to promote democracy

### Governance: An Information perspective

- ◆ Representative democracy relies on supposition that best way to make a decision is wider participation for all its citizens having access to relevant information.
- ◆ Government is by nature an information intensive organization.
- ◆ Information is power and information management is political.

**Governance : In IT framework**

- ◆ Expansion of Internet and electronic commerce, is redefining relationships among various stakeholders in the process of Governance.
- ◆ A new model of governance would be based upon the transactions in virtual space, digital economy and dealing with knowledge oriented societies.
- ◆ Electronic Governance is an emerging trend to re-invent the way the Government works.

**e-Governance : Focus**

- ◆ Greater attention to improve service delivery mechanism
- ◆ Enhancing the efficiency of production
- ◆ Emphasis upon the wider access of information

**e-Governance vs. e-Government**

<b>GOVERNMENT</b>	<b>GOVERNANCE</b>
superstructure	functionality
decisions	processes
rules	goals
rules	performance
implementation	coordination
outputs	outcomes
<b>e-Government</b>	<b>e-Governance</b>
electronic service delivery	electronic consultation
electronic work flow	electronic controllership
electronic voting	electronic engagement
electronic productivity	networked societal guidance

**Why e-Governance?**

e-Government can transform citizen service, provide access to information to empower citizens, enable their participation in government and enhance citizen economic and social opportunities, so that they can make better lives, for themselves and for the next generation.

**1.11 SUMMARY**

In this unit, you have studied the evolution of a computer from a simple device like the abacus to the more sophisticated ones as seen today, and its characteristics (speed, accuracy, diligence, versatility, and storage capacity) that have contributed towards making it such a popular device. The differences between concepts like hardware/software, system/application software, bits/bytes, ROM/RAM was also explained. Various types of input, output and secondary storage devices along with their usages, were also studied.

## 1.12 ANSWERS TO SAQs

**SAQ 1 :** Computer characteristics :

- (a) Speed (b) Accuracy (c) Diligence  
(d) Versatility (e) Storage capacity

**SAQ 2 :** Computers can be classified into various generations based on the following features :

- (a) Technology used (b) Speed (c) Storage capacity  
(d) Programming language

Computer Generation	Technology Used	Speed	Storage Capacity	Programming Language
First	Vacuum tubes	Slow	Limited	Symbolic language
Second	Transistors	Relatively faster	Increased storage capacity	High Level Languages (e.g. COBOL, FORTRAN)
Third	Integrated Circuits (ICs)	Better performance, Remote processing and time sharing	Increased storage	Extensive use of High Level Languages
Fourth	Large scale and very large scale integrated circuits (LSI, VLSI)	Considerably faster	Increased storage	Sophisticated programs and languages for special applications
Fifth	Use of ICs with ultra large scale integration technology (ULSI)	Extremely fast	Larger capacity storage (RAID, optical disks)	Based on Artificial Intelligence

**SAQ 3 :** The basic components of the computer system include :

**Input Unit :** Input unit receives data and instructions in a form that can be understood by the computer.

**Output Unit :** Output unit presents processed information in a form that can be understood by the user.

**Main Memory :** Main memory holds data and instructs after input, till needed. Also holds information awaiting output.

**Arithmetic Logic Unit :** Arithmetic logic unit performs calculations and comparisons based on the instructions.

**Control Unit :** Control unit interprets each instruction and prompts the execution by one of the units – input, output, ALU, storage.

**Secondary Storage :** Secondary storage supplements main storage, and stores data and instructions permanently.

**SAQ 4 :** (a) True (b) False

**SAQ 5 :** The main memory in the computer system is referred to as RAM (Random Access Memory). It is fast access memory and is used to store data and instructions during computer operations. The main feature of RAM is that it can be read from and written onto any location and can be accessed randomly (hence the name RAM). The contents of RAM are available only as long as the computer is on and are lost once it is switched off. It is, therefore, also called 'volatile' memory. Secondary storage can be used to store data and instructions permanently.

ROM or Read Only Memory holds data or instructions permanently and as the name suggest, can only be read from but cannot be changed by the users. It is non-volatile in nature, which means that contents of ROM are not lost even if the power is switched off. It, therefore, usually contains instructions that are required to get the computer started once it is powered on. The contents of ROM are built into it at the time of manufacturing itself.

## QUIZ

- Which device is used as the standard pointing device in a Graphical User Environment?  
(a) Keyboard (b) Mouse (c) Joystick (d) Track ball
- Which number system is usually followed in a typical 32-bit computer?  
(a) 2 (b) 10 (c) 16 (d) 32
- Which number system is usually followed in a typical 32-bit.  
(a) Binary (b) Decimal (c) Hexadecimal (d) Octal
- Which of the following is not an output device?  
(a) Scanner (b) Printer (c) Flat Screen (d) Touch Screen
- Which of the following devices have a limitation that we can only store information to it but cannot erase or modify it?  
(a) Floppy (b) Hard Disk (c) Tape Drive (d) CD Rom
- Which technology is used in Compact disks?  
(a) Mechanical (b) Electrical (c) Electro Magnetic (d) Laser
- Which of the following storage devices can store maximum amount of data?  
(a) Floppy Disk (b) Hard Disk (c) Compact Disk (d) Magneto Optic Disk
- Which of the following is the largest manufacturer of Hard Disk Drives?  
(a) IBM (b) Seagate (c) Microsoft (d) 3M
- The programs which are as permanent as hardware and stored in ROM is known as  
(a) Hardware (b) Software (c) Firmware (d) ROM ware
- Memory is made up of  
(a) Set of wires (b) Set of circuits (c) Large number of cells (d) All of these

11. FORTRAN programming language is more suitable for \_\_\_\_\_  
(a) Business Applications (b) Marketing Applications  
(c) Scientific Applications (d) None of the above
12. Mostly which of the following device is used to carry user files?  
(a) Floppy Disk (b) Hard Disk (c) RAM (d) CD ROM
13. Which device is used to backup the data?  
(a) Floppy Disk (b) Tape (c) Network Drive (d) All of the above
14. In order to play and hear sound on a computer, one needs:  
(a) a sound card and speakers (b) a microphone  
(c) all of them required (d) none of them required
15. Which of the following are the cheapest memory devices in terms of Cost/Bit?  
(a) Semiconductor memories (b) Magnetic Disks  
(c) Compact Disks (d) Magnetic Tapes
16. In a computer \_\_\_\_ is capable to store single binary bit.  
(a) Capacitor (b) Flip flop (c) Register (d) Inductor
17. A set of flip flops integrated together is called \_\_\_\_\_.  
(a) Counter (b) Adder (c) Register (d) None of above
18. Which of the following are the best units of data on an external storage.  
(a) Bits (b) Bytes (c) Hertz (d) Clock cycles
19. A register organised to allow to move left or right operations is called a \_\_\_\_\_.  
(a) Counter (b) Loader (c) Adder (d) Shift register
20. Which of the following have the fastest access time?  
(a) Semiconductor Memories (b) Magnetic Disks  
(c) Magnetic Tapes (d) Compact Disks

## COMPUTER FUNDAMENTAL QUESTIONS AND ANSWERS

1. Which one of the following is not an input device?  
(a) Mouse (b) Keyboard (c) Bar code reader (d) Monitor
2. The full form of UPS?  
(a) Uniform Power Supply (b) Uninterruptible Power Supply  
(c) Universal Power Supply (d) Unidirectional Power Supply
3. The domain name for government institutions.  
(a) org (b) gov (c) com (d) firm
4. Which device is used to display graphics and information on video screen?  
(a) CPU (b) Modem (c) Scanner (d) Monitor
5. The programs or instructions that tells the computer what to do:  
(a) Software (b) Hardware (c) Scanner (d) Monitor
6. Compact Disk was invented by :  
(a) James T. Russel (b) Sabir Bhatia (c) Ray Tomilson (d) Mercony

- 7. A device that connects to a network without the use of a cable is said to be  
(a) Distributed (b) Centralised (c) Open source (d) Wireless
- 8. The main system board of a computer is called.  
(a) Integrated circuit (b) Motherboard (c) Processor (d) Microchip
- 9. A website address is a unique name that identifies a specific \_\_\_\_\_.
- 10. \_\_\_\_\_ is processed by the computer into information.  
(a) Numbers (b) Processor (c) Input (d) Data
- 11. Most websites have a main page, the \_\_\_\_\_ which acts as a doorway to the rest of the website pages.
- 12. The diagram which represents the order of functions in a program is called a \_\_\_\_\_.
- 13. The basic unit of a work sheet into which you enter data in Excel is called a \_\_\_\_\_.
- 14. Address of the first cell in the work sheet is \_\_\_\_\_.
- 15. When a computer suddenly stops working, it is said to be \_\_\_\_\_.
- 16. Paint brush belong to \_\_\_\_\_.
- 17. CPU gets the address of the next instruction to be processed from \_\_\_\_\_.
- 18. What are the speakers attached to your computer used for \_\_\_\_\_.

**Answers :**

- (1) Monitor (2) Uninterruptible Power Supply (3) gov
- (4) Monitor (5) Software (6) James T. Russel
- (7) Wireless (8) Motherboard (9) Website
- (10) Data (11) Home page (12) Flow chart
- (13) Cell (14) A1 (15) Hanged
- (16) Applications (17) Program counter (18) Handling sound and music

\*\*\*\*\*