Computer Awareness

BOLT

Special Edition E-Book

CLICK HERE TO PREPARE FOR
IBPS, SSC, SBI, RAILWAYS & RBI EXAMS IN ONE PLACE

Bolt is a series of GK Summary ebooks by Oliveboard for quick revision
# Table of Contents

**Introduction to Computers** ............................................................................................................. 4
  - Characteristics of Computers ........................................................................................................ 4
  - History of Computers ..................................................................................................................... 4
  - Generation of Computers .............................................................................................................. 5
  - Types of Computers ..................................................................................................................... 6
  - Fundamentals of Computer .......................................................................................................... 7

**Basic Computer Organization and Data processing Cycle** ............................................................... 9
  - Primary Memory ............................................................................................................................ 9
  - Secondary Memory ........................................................................................................................ 10

**Computer Peripheral** ..................................................................................................................... 12
  - Input Devices .............................................................................................................................. 12
  - Output Devices ............................................................................................................................ 13

**Operating System** .......................................................................................................................... 16
  - Layered Structure of Operating System ...................................................................................... 16
  - Functions of Operating systems .................................................................................................. 16
  - Types of Operating Systems ....................................................................................................... 17
  - Other Terms related to Operating System .................................................................................. 18

**Software** .......................................................................................................................................... 19
  - System Software .......................................................................................................................... 19
  - Application Software ................................................................................................................... 19

**Computer Languages** ..................................................................................................................... 20
  - Low-Level languages ................................................................................................................... 20
  - High-Level languages .................................................................................................................. 21
  - Object-Oriented Programming ..................................................................................................... 21
  - Other related terms ....................................................................................................................... 22

**Memory Storage Units** ..................................................................................................................... 22

**Number System** ............................................................................................................................. 23

**Logic Gates** .................................................................................................................................... 24

**Database Management System** ....................................................................................................... 26
  - Architecture (Levels of Data Abstraction in DBMS) ................................................................... 26
  - Keys in DBMS .............................................................................................................................. 27

**Microsoft Office** ............................................................................................................................. 27
  - Microsoft Word ............................................................................................................................ 27
  - Microsoft Excel ............................................................................................................................. 30
  - Microsoft PowerPoint .................................................................................................................... 33

**File Extension** .................................................................................................................................. 37

**Computer Network** ......................................................................................................................... 38
  - The five components of a computer network are: .................................................................... 38
  - Types of Computer Network ....................................................................................................... 38
  - Network Architecture .................................................................................................................. 39
  - Other Terms used in networks .................................................................................................... 39
Introduction to Computers

A Computer is an electronic device that performs calculations and operations based on instructions provided by a software or hardware program.

Characteristics of Computers

1. **Speed** – A computer can process millions of calculations per second. The speed of computation is very high.
2. **Accuracy** - As computers work on inbuilt software programs, there is no scope for human errors and highly accurate.
3. **Diligence** – Computers are highly reliable. They can perform complex and long calculations with the same speed and accuracy.
4. **Versatility** - Computers are versatile in Nature. They can perform various operations at the same time.
5. **Storage** - Computers can store a large amount of data or instructions in its memory which can be retrieved at any point of time.

History of Computers

A Computer was intended for making a person capable of performing numerical calculations with the help of a mechanical computing device.

**Abacus**

Abacus was the first counting device which was developed in China. It consists of a rectangular wooden frame and beads. The wooden frame contains horizontal rods and the beads which are passed through the rods. The beads of counters represent digits. The device is used to perform simple addition and subtraction.

**Napier’s Bones**

It was a device which contained a set of rods made of bones. It was developed by a Scottish Mathematician, John Napier. To perform multiplication and division, the device was developed. Napier also invented logarithms.

**Pascaline**

Pascaline was the first calculating device with a capability to perform additions and subtractions on whole numbers. It was developed by Blaise Pascal, a French Mathematician. The device made up of interlocked cog wheels having numbers 0 to 9 on its circumference. When one wheel completes its rotation, the other wheel moves by one segment.

**Punched Card System**

Punched Card System was invented by Herman Hollerith, an American Statistician. It was used for storing and retrieving data. In the form of punched holes, the system data could be stored.

**Charles Babbage’s Calculating Engines (1792-1871)**

Babbage invented the Difference Engine to solve algebraic expressions and mathematical tasks accurately. Later, he designed some improvements to his first computer. The modified machine is called the Analytical Engine. He intended to design a machine with a collection of the four basic arithmetic functions. The design principle of the Analytical Engine can be divided into Input, Output, Memory, Central Processing Unit. The parts and working principle of an Analytical engine are the same as today’s computer. Hence, Charles Babbage is known as the Father of Computer.

**Hollerith Machine**

A Hollerith machine was incorporated with the tabular and punched cards. The machine could census the punched holes, recognise the number and make the required calculation and store the data of census. The machine was invented by Herman Hollerith.

**Mark I Computer**

The first electro-mechanical computing device was developed by Howard Hathaway Aiken. He used Hollerith’s punch card and Babbage’s statements to develop Mark I computer with IBM. In Mark III computer, he used some electronic components and Magnetic drum memory. In Mark IV computer, he used all electronic components and Magnetic drum memory & Magnetic core memory.

**First Un-programmable Electronic Digital Computer (ABC)**

The Atanasoff-Berry Computer (ABC) was the first electronic computer. It was designed by John Vincent Atanasoff and Clifford E. Berry. It was designed to solve systems of linear algebraic equations. It was also the first to use capacitors for storage.
Electronic Numerical Integrator and Calculator – ENIAC
ENIAC was the first electronic computer used for general purposes, such as solving numerical problems. It was invented by J. Presper Eckert and John Mauchly.

Electronic Discrete Variable Automatic Computer – EDVAC
EDVAC was the successor of ENIAC. In this computer, Binary numbers were used for arithmetic operations and the internal storage of instructions were also written in digital forms.

Electronic Delay Storage Automatic Calculator – EDSAC
EDSAC was the first practical general-purpose stored-program electronic computer. It was built according to the von Neumann machine principles.

Universal Automatic Computer - UNIVAC
UNIVAC was the first commercially available computer. It was made by the Eckert-Mauchly Computer Company. It represents the birth of the modern computers.

Micro Processor – INTEL 4004
In 1969, Intel Corporation designed the first general-purpose programmable processor INTEL 4004. It was a set of four chips known as the MCS-4. It included a central processing unit chip (the 4004) as well as a supporting read-only memory chip for the custom applications programs, a random-access memory (RAM) chip for processing data, and a shift-register chip for the input/output (I/O) port.

Quick Revision

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Name of Person/System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father of Computer</td>
<td>Charles Babbage</td>
</tr>
<tr>
<td>Father of Modern Computer Science</td>
<td>Alan Turing</td>
</tr>
<tr>
<td>First Non-programmable Electronic Digital Computer</td>
<td>Atanasoff Berry Computer (ABC)</td>
</tr>
<tr>
<td>First General Purpose Electronic Digital Computer</td>
<td>Electronic Numerical Integrator and Calculator (ENIAC)</td>
</tr>
<tr>
<td>First Micro Processor</td>
<td>INTEL 4004</td>
</tr>
<tr>
<td>First Commercially Available Computer</td>
<td>Universal Automatic Computer</td>
</tr>
</tbody>
</table>

Generation of Computers

First Generation Computers – (1946-1959)
The first-generation computers were used vacuum tubes as the electronic components. They occupied a very large space and performed computations in milliseconds. Machine languages are used. Examples – EDSAC, EDVAC, UNIVAC, IBM-701, IBM-650.

Second Generation Computers – (1959-1965)
The second-generation computers replaced Vacuum Tubes with Transistors. They used assembly languages and batch processing operating system. Magnetic cores and magnetic tapes were used as storage. Examples – IBM-1620, IBM -7094, CDC-1604, CDC-3600.

Third Generation Computers – (1965-1971)
The third-generation computers replaced transistors with integrated circuits (ICs). They performed computation in Nanoseconds. It used high-level languages like FORTRAN, COBOL, PASCAL, ALGO-68, BASIC was used. In this generation, remote processing, time-sharing, multi-programming operating system were used. Examples - IBM-360 series, Honeywell-6000 series, PDP, IBM-370/168.

The fourth-generation computers are used Very Large Scale Integrated (VLSI) circuits. Semi-conductor devices are used as primary memory. Magnetic disks are used as secondary storage. Problem-oriented fourth generation languages (4GL) are used. Multi-processing and multiprogramming operating systems are used. Example – Apple series – I & II, IBM 4341, DEC 10, STAR 1000, PUP 11.
Fifth Generation Computers – (1980 - Present)

The fifth-generation computers use ultra large scale integrated (ULSI) chips that contain millions of components on a single chip. They are in the developmental stage which is based on the artificial intelligence. These computers can also respond to natural language input. Biochips will be used as memory devices and KIPS (Knowledge-based Information Processing System) architecture will be used.

Examples – Robots, Supercomputers.

Types of Computers

Based on Operation

- **Analog Computer** - An Analog computer stores data continuously in the form of physical quantities and perform calculations with the help of measures. It produces output in the form of a graph. They are used in the calculation of physical variables such as voltage, pressure, temperature, speed, etc.
- **Digital Computer** - A Digital computer is the most commonly used type of computer and is working with data represented in digital form, usually binary 0s and 1s. It can perform faster and give more accurate results. They are extensively used for solving complex problems in the field of engineering & technology, design, research and data processing.
- **Hybrid Computer** – A Hybrid computer is a combined feature of Analog and Digital computers. In large industries and businesses, a hybrid computer can be used for logical operations as well as efficient processing of differential equations.

Based on Configuration

- **Micro Computer** – Microcomputers are small, inexpensive computer for personal use. They are popularly used at homes for playing games and surfing the Internet.
- **Mini Computer** - Minicomputers possess most of the features and capabilities of a large computer but are smaller in physical size. They are used as small or mid-range operating business and scientific applications.
- **Mainframe Computer** – Mainframe computers are expensive and large size computers and they are capable of supporting hundreds of users simultaneously. They are used for specific large-scale applications.
- **Super Computer** - Supercomputers are powerful, expensive and the fastest computers. They have architectural and operational principles from parallel and grid processing for performing billions and trillions of calculations per second. They are used for applications that require large amounts of mathematical computations like weather forecasting, fluid dynamics, graphic design etc.

India launched ‘Mihir’ supercomputer recently to improve India's weather forecasting.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Name of the Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Super Computer in the world</td>
<td>Cray CDC 6600</td>
</tr>
<tr>
<td>Fastest Super Computer in the world</td>
<td>Summit by the USA</td>
</tr>
<tr>
<td>First Super Computer of India</td>
<td>PARAM 8000</td>
</tr>
<tr>
<td>Fastest Super Computer in India</td>
<td>Pratyush</td>
</tr>
</tbody>
</table>

Based on Utility

- **General Purpose Computer** - A general purpose computer can perform an extensive variety of operations. It can store and execute different programs in its internal storage. All mainframes, servers, laptop and desktop computers, smartphones and tablets are general-purpose devices.
- **Special Purpose Computer** - Special purpose computers are designed to solve specific problems. The instructions are pre-programmed permanently in the computer. It completely controlled by automated manufacturing processes. Example – Aircraft control system, Electronic voting machines etc.

Based on Mode of Use

- **Palmtop Computer** – Palmtop computers are small which can fit in the palm of a hand. The electronic pen is used to give an input. They have small disk storage and can be connected to a wireless network.

www.oliveboard.in
➢ **Laptop Computer** – Laptop computers are portable with less weight. It can be transported easily and used in temporary space such as Airplane, Meetings etc. They are designed for low power consumption and have an attached keyboard and a touchpad.

➢ **Personal Computer (PC)** - A personal computer is a cost-effective computer that is designed for a single end-user. PC is dependent on microprocessor technology, which allows PC makers to set the entire central processing unit (CPU) on a single chip.

➢ **Workstation** - Workstation (WS) is faster than Personal Computer. It is designed for a user or group of users with better multitasking capability, additional Random-Access Memory, Higher-speed graphics adapters and drive capacity.

➢ **Client and Server** – The server is a device that manages the sharing of network resources to the users. An Application server, File server, Virtual server, Mail server are some types of server. A client is the receiving end of the service which made by the server. It requests the server and gains access with the server.

### Fundamentals of Computer

A computer system has four basic components.

#### Parts of a computer system

- **Hardware** - It represents the physical and tangible components of the computer (keyboard, mouse, monitor etc.)

- **Software** – It is a set of electronic instructions called programs that make the computer perform tasks.

- **Data** – It is a set of facts, which the computer stores and reads in the form of numbers.

- **Users** - Users are the people who make use of a computer to obtain certain results/outcomes.

#### Mother Board

It is the main printed circuit board of a computer that carries the central processing unit (CPU) chip, Read Only Memory (ROM), Random Access Memory (RAM) and the basic input output system (BIOS) chip.

1. Which of the following refers to the process of starting a computer from a powerless state and setting it up to normal working condition? (NABARD)
   - (1) Cold Boot
   - (2) Cold Start
   - (3) Dead Start
   - (4) Hard Boot
   - (5) All of the above

2. Which of the following looks for system files during a boot process? (UIICL Assistant)
   - (1) CPU
   - (2) Monitor
   - (3) Keyboard
   - (4) BIOS
   - (5) Interrupt Handlers

3. Specialised program(s) designed to allow input or output device(s) to communicate with the rest of the computer system is called _______. (RBI Asst. Mains)
   - (1) Utility Software's
   - (2) Operating system
   - (3) Device Driver
   - (4) Language Translator
   - (5) BIOS

4. Which among the following type of computers is also known informally as Number crunchier? (RBI Asst. Mains)
   - (1) Minicomputer
   - (2) Supercomputer
   - (3) Micro computer
   - (4) Mainframe computer
   - (5) Hybrid computer

5. Which among the following organisation developed a SAGA-220 supercomputer in 2011? (RBI Asst. Mains)
   - (1) NASA
   - (2) DRDO
   - (3) ISRO
   - (4) JAXA
   - (5) ICMR
6. Name the program a personal computer’s microprocessor uses to get the computer system started after you turn it on? (RBI Asst. Mains)

(1) Vertical Programme  (2) BIOS Programme  (3) Horizontal Programme  
(4) Application software  (5) None of these

Answer keys

1. (5)  2. (4)  3. (3)  4. (2)  5. (3)  6. (2)

Solutions

1. Cold boot is the process of starting a computer from shutdown or a powerless state and setting it to normal working condition. A cold boot refers to the general process of starting the hardware components of a computer, laptop or server to the point that its operating system and all start up applications and services are launched. Cold boot is also known as hard boot, cold start or dead start.

2. BIOS looks for the system files during a boot process. The BIOS is special software that interfaces the major hardware components of your computer with the operating system. It is usually stored on a Flash memory chip on the motherboard, but sometimes the chip is another type of ROM.

3. A device driver or hardware driver is a group of files that enable one or more hardware devices to communicate with the computer's operating system. Without drivers, the computer would not be able to send and receive data correctly to hardware devices, such as a printer. If problems or conflicts are encountered with a driver, the computer manufacturer or hardware manufacturer releases a driver update to fix the problems.

4. Supercomputers are sometimes called number cruncher. They can do a great deal of arithmetic very quickly, have a great deal of high-speed storage (main memory) and have very fast internal communications. The term number cruncher is sometimes applied to programs. For example, statistical programs are number crunchers because their main task is to perform mathematical calculations.

5. The Indian Space Research Organisation (ISRO) has built India's fastest supercomputer in terms of theoretical peak performance — 220 trillion floating point operations per second (FLOPS). K. Radhakrishnan, ISRO Chairman, inaugurated the supercomputer, SAGA-220, at the newly established supercomputing facility, named after Satish Dhawan, of the Vikram Sarabhai Space Centre.

6. BIOS (basic input/output system) is the program a personal computer's microprocessor uses to get the computer system started after you turn it on. It also manages data flow between the computer's operating system and attached devices such as the hard disk, video adapter, keyboard, mouse and printer.
Basic Computer Organization and Data processing Cycle

The Basic Diagram of the Computer consists of Input Unit, Output Unit and Central Processing Unit.

**Input Unit**
The input unit is used for giving instructions and data by using input devices. It converts these instructions and data to the computer acceptable format and it supplies the converted instructions and data to the computer system for further processing.

**Central Processing Unit**
The central processing unit (CPU) performs most of the processing inside a computer. CPUs have been constructed on a single integrated circuit called a microprocessor. It consists of the control unit, the Arithmetic Logic Unit (ALU), and the memory unit.

1. **Control Unit**
The control unit manages the computer's various components. It reads and interprets (decodes) the program instructions, transforming them into control signals that activate other parts of the computer.

2. **Arithmetic Logic Unit**
The ALU can perform arithmetic and logical operations. The set of arithmetic operations that an ALU supports to addition, subtraction and more complex mathematical operations. Logic operations involve Boolean logic like AND, OR, XOR, and NOT. These can be useful for creating complicated conditional statements.

3. **Memory Unit**
Computer main memory consists of primary and secondary memory.

**Primary Memory**
Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data is lost when power is switched off. It is generally made up of the semiconductor device. It is a volatile memory. The two types of primary memory are Random Access Memory (RAM) & Read Only Memory (ROM).

**RAM (Random Access Memory)** - RAM is the internal memory of the CPU for storing data, program and result of the program. It is read/write memory which stores data till the machine is working. Some types of RAMs are Dynamic RAM (DRAM), Static RAM (SRAM) and Synchronous Dynamic RAM (SDRAM), etc.
Dynamic Random-Access Memory (DRAM) – Dynamic memory must be constantly refreshed, or it loses its contents. This type of memory is more economical.

Static Random-Access Memory – SRAM is faster and less volatile than DRAM but requires more power and is more expensive. It does not need to be refreshed like a DRAM.

Synchronous Dynamic Random-Access Memory – A type of DRAM that can run at much higher clock speeds.

ROM (Read Only Memory) - ROM stores data permanently on personal computers (PCs) and other electronic devices. It performs major input/output tasks and holds programs or software instructions. It is non-volatile.

MROM (Masked ROM) - The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kinds of ROMs are known as masked ROMs which are inexpensive.

PROM (Programmable Read Only Memory) - PROM can be modified only once by a user. The user can buy a blank PROM and enter the desired contents using a PROM program.

EPROM (Erasable and Programmable Read Only Memory) - The EPROM can be erased by exposing it to ultra-violet light. EPROMs have a Quartz window in the package to expose the chip to UV light. They were widely used as the BIOS (Basic Input Output System) chips in computer motherboards.

EEPROM (Electrically Erasable and Programmable Read Only Memory) - The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 milliseconds. They were also used as BIOS chips.

Secondary Memory

Secondary memory stores data on a long-term basis. It cannot be processed directly by the CPU. It must first be copied into primary storage. Secondary memory devices include magnetic disks like hard drives and floppy disks, optical disks such as CDs and CDROMs, and magnetic tapes, USB Flash drives.

Hard drive – It is a non-removable storage device containing magnetic disks or platters rotating at high speeds. The hard drives store data in segments of concentric circles. It may spin at 5,400 to 15,000 RPM.

Floppy Disk - Floppy disk is composed of a thin, flexible magnetic disk sealed in a square plastic carrier. Floppy disks were widely used to distribute software, transfer files, and create backup copies of data. To read and write data from a floppy disk, a computer system must have a floppy disk drive (FDD).

Compact Disc (CD) - A compact disc is a portable storage medium that can be used to record, store data in digital form. They are fragile and prone to scratches.

Compact disc read-only memory (CD-ROM) - It is a storage device that can be read but can't change or delete it.

Digital Video Disc (DVD) - A device currently used to store data in large amounts and accepts high definition material. A two-layered DVD can hold approximately 17 gigabytes of video, sound, or other data.

Blue-ray Disc – The upgraded version of CD and DVD discs and drives are the Blu-ray discs. It is commonly known as BD-ROM. The Maximum capacity of BD disc is 25GB if single layer and 50 GB if dual layer.

Holographic Versatile Disc (HVD) – It is a holographic storage format and has a maximum capacity of 3.9 terabytes.

Flash Drives – Flash drives are small, ultra-portable storage device. They connect to computers and other devices via a built-in USB plug. They are often referred to as pen drives, thumb drives, or jump drives. Mostly they have a storage capacity from 8 GB to 64 GB.

Zip Disks – An advanced version of the floppy disk is known as Zip Disks. It was developed by Iomega. Zip disks are available in 100 and 250-MB and 750 MB capacities and they are used to store, share and back up large amounts of data.

Cache Memory - It is a very high-speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and main memory. Example: Registers

Virtual Memory - Virtual memory permits software to use additional memory by utilizing the hard disk drive (HDD) as temporary storage.
Quick Revision

<table>
<thead>
<tr>
<th>Types</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semiconductor Memory</td>
<td>RAM, ROM</td>
</tr>
<tr>
<td>Optical Memory</td>
<td>CD-ROM, CD-R, DVD, HVD, Blu-ray Disc</td>
</tr>
<tr>
<td>Magnetic Memory</td>
<td>Hard Disk Drive (HDD), Floppy Disk Drive (FDD)</td>
</tr>
<tr>
<td>Flash Memory</td>
<td>Pen drive, Memory card etc (EEPROM Technology devices)</td>
</tr>
</tbody>
</table>

Output Unit

The output unit provides the information from the computer to an external device. It presents a soft/hard copy of the information which can be readable by the users.

1. Which of the following is the responsibility of a logical unit in CPU? (NABARD)
   (1) To perform complex Mathematical Problems. (2) To provide output in the monitor.
   (3) To Compare numbers. (4) To process the input information.
   (5) To channelize the flow of information.

2. Which of the following refers to a standard interface for connecting a motherboard to storage devices such as hard drives and CD ROM/DVD drives? (NABARD)
   (1) USB (2) IDE (3) HWA (4) PCS (5) DTR

3. Which of the following is NOT true about RAM? (UIICL Assistant)
   (1) RAM scores certain fixed routines such as the boot – up routines.
   (2) RAM is volatile which means when the computer is switched off, the contents are lost.
   (3) The contents cannot be changed or deleted.
   (4) Both (1) and (3)
   (5) All the above statements are wrong.

4. Which of the following is a part of primary storage that holds a software programme and small amounts of data when they are brought from secondary storage? (RRB PO)
   (1) ROM (2) Register (3) Cache (4) RAM (5) CPU

5. The storage area for the next likely data or instruction to be processed preventing bottleneck and slowing of the system is known as ________. (RRB PO)
   (1) Cache (2) Cookies (3) Register (4) CPU (5) RAM

Answer keys

1. (3) 2. (2) 3. (4) 4. (4) 5. (1)

Solutions

1. To compare numbers is the responsibility of the logical unit in the CPU of a computer.

2. Integrated Drive Electronics (IDE) is a standard interface for connecting a motherboard to storage devices such as hard drives and CD-ROM/DVD drives. IDE is also known as Advanced Technology Attachment (ATA) or Intelligent drive electronics (IDE).

3. RAM – Random Access Memory
   The main function of RAM is to store the currently active programs and their data. RAM is volatile which means when the computer is switched off, the contents are lost.
The contents of RAM can be changed or deleted.

4. Random access memory (RAM) is the part of primary storage that holds a software program and small amounts of data for processing. When you start most software programs (such as Microsoft Word) on your computer, the entire program is brought from secondary storage into RAM.

As you use the program, small parts of the program’s instructions and data are sent into the registers and then to the CPU. Compared with the registers, RAM stores more information and is located farther away from the CPU.

5. The storage area for the next likely data or instruction to be processed preventing bottleneck and slowing of the system is known as the Cache.

### Computer Peripheral

A peripheral device links to a computer system to enhance the functionality of the computer. It is not part of the core computer architecture. Input devices, output devices, and storage devices are the types of peripheral devices.

#### Input Devices

Input devices serve as a link between a user and the computer. It allows users to feed instructions and data to computers for processing, display, storage and/or transmission. Some input devices are:

1. **Keyboard** – It is used to enter data into the computer in both alpha and numeric forms.
   - Some important keys in a keyboard are:
     - **Toggle Keys** - It is used to change the input mode of a group of keys on a keyboard. Caps Lock, Num Lock, Scroll Lock are toggle keys.
       - **Caps Lock** – Capitalizes all letters.
       - **Num Lock** – Makes sure numbers are inputs from the keypad.
       - **Scroll Lock** - Allows the arrow keys to scroll through the contents of a window.
     - **Modifier Keys** - It is a special key (key combination) that temporarily modifies the normal action of another key when pressed together. Shift, Alt, Ctrl, Fn are modifier keys.
       - **Shift** - used for capitalizing letters and entering different types of symbols.
       - **Function (Fn)** - Other functions such as brightness and volume control.
       - **Control (Ctrl)** - used for entering keyboard shortcuts, such as Ctrl+S, Ctrl+P etc.
       - **Alt** - used in combination with the numeric keys and the Control key for entering keyboard shortcuts.
     - **Function Keys** - A key on a computer keyboard, distinct from the main alphanumeric keys, to which software can assign a function. F1 - F12 keys are known as function keys and each key performs a different function. It may be used as single key commands (e.g., F5) or combined with one or more modifier keys (e.g., Alt+F4).
     - **Escape Key** – It is located in the upper left corner of a computer keyboard. It is often used to quit, cancel, or abort a process which is running on a computer.

2. **Mouse** - It is a pointing and cursor-control device. A round ball at its base senses the movement of a mouse and sends corresponding signals to CPU when the mouse buttons are pressed. A mouse has two or three buttons called Left, Right, and Middle button.

3. **Joy Stick** – It is used to move the cursor position on a monitor screen. It is mainly used in Computer Aided Design (CAD) and playing games on the computer. It can also be helpful as an input device for people with movement disabilities.

4. **Track Ball** – It is mostly used in notebooks or laptops. It is a ball which is half inserted and by moving fingers on the ball, the pointer can be moved.

5. **Scanner** – It captures images from printed material and converts it into a digital format that can be stored within the PC. Flatbed Scanners, Hand Scanners, Sheetfed Scanner are some types of scanner.

6. **Barcode Reader** – It is an electronic device for reading printed barcodes. A light sensor in the barcode reader can read the barcode and translates optical impulses into electrical impulses to store the data into the computer. It is an important tool for warehouse management and operations.
7. **Magnetic Ink Character Recognition (MICR)** – It is a character recognition system that uses special ink and characters. It is used to verify the legitimacy or originality of paper documents, especially cheques. Information can be encoded in the magnetic characters. It provides a secure, high-speed method of scanning and processing information.

8. **Optical Character Recognition (OCR)** - It is a technology that recognizes text within a digital image. It converts the document to an editable text file.

9. **Optical Mark Recognition (OMR)** – It is an electronic method that scans the document and reads the data from the marked fields and results can be transmitted into the computer.

10. **Digitizer** – It allows users to draw and manipulate graphics on the screen. It is also known as a graphics tablet. These kinds of tablets typically designed for CAD/CAM professionals.

11. **Touch Screen** - It is a computer display screen that serves as an input device. A touchscreen can be touched by a finger or stylus. Touchscreen records the event and sends it to a controller for processing.

12. **Microphone** – Microphone translates sound vibrations in the air into electronic signals. It enables many types of audio recording devices for purposes including communications, music and speech recording.

13. **Web Camera** – It captures and stores images in digital form. The stored images can be archived on a photographic compact disc or external hard disk.

14. **Light Pen** - It is a light-sensitive input device, used to select text, draw pictures and interact with user interface elements on a computer screen or monitor.

**Output Devices**

The Output devices are used to send data from a computer to another device. Examples are monitors, projectors, speakers, plotters, and printers etc.

1. **Monitors** – Monitors are the main output device of a computer. It forms images from tiny dots that are arranged in a rectangular form. The sharpness of the image depends on the number of pixels. There are two kinds of viewing screens used for monitors.
   (i) **Cathode-Ray Tube (CRT)** - The CRT display is made up of small picture elements called pixels. CRT tube creates an image on the screen using a beam of electrons.
   (ii) **Flat-Panel Display** - The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement in comparison to the CRT.
   (iii) **Liquid Crystal Display (LCD) Monitor** - LCD monitors use compact fluorescent tubes to illuminate and brighten the image on the screen and produce good image quality, resolution and contrast levels.
   (iv) **Light Emitting Diode (LED) Monitor** - LED monitors use new backlighting technology to improve picture quality. The LED monitor is more lifelike and accurate due to the improved contrast ratios and colour saturation over LCD.
   (v) **Organic Light Emitting Diode (OLED) Monitor** – This type of monitor made up of some organic material (containing carbon, like wood, plastic or polymers) that is used to convert the electric current into light. They are directly used to produce the correct colour and there is no need for backlight which saves power and space.

2. **Printers** – Printers are output devices that prints information in the form of text/images on a paper. Impact Printers and Non-impact printers are the two types of printers.
   (i) **Impact Printers** - The impact printers print the characters by striking them on the ribbon which is then pressed on the paper. Examples: Dot-Matrix Printers, Line Printers, Daisy wheel printer, Drum printer, Chain printer, Band printer.

   - **Dot-Matrix Printers** – It prints characters as a combination of dots. They have a matrix of pins on the print head of the printer which form the character. They generally have 9-24 pins. Their speed is measured in cps (Character per second).

   - **Line Printers** - A line printer is an impact printer which can print one line of text at a time. It is also known as a bar printer.

   (ii) **Non-Impact Printers** - Non-impact printers print the characters on the paper without using ribbon. These printers print a complete page at a time, so they are also called as page printers. Examples - Laser Printers, Inkjet Printers etc.

   - **Laser Printers** - A laser printer is a popular type of personal computer printer that uses a non-impact photocopier technology. The type of ink used in a laser printer is dry. It gives high-quality output. The resolution of laser printers is measured in dpi (dots-per-inch).
Inkjet Printers - Inkjet printers work by spraying ink on a sheet of paper. The type of ink used in an inkjet printer is wet.

(iii) Other Types

Solid Ink Printer - It is a type of colour printer. It works by melting the solid ink that applies the images to the paper. It is non-toxic and convenient to handle.

LED Printer - This type of printer uses a light emitting diode instead of a laser. It starts by creating a line-by-line image of the page.

3. Plotters - A plotter is an output device used to produce hard copies of large graphs and designs on paper, such as construction drawings, architectural plans, and business charts. Drum plotters and Flatbed plotters are the types of plotters.

(i) Drum plotter – It is a pen plotter that wraps the paper around a drum with a pin feed attachment. The drum then rotates the paper as pens move across it and draw the image. It is used to produce continuous output, such as plotting of earthquake activity. It is also known as Roller Plotter.

(ii) Flatbed plotter - It plots on paper that is spread and fixed over a rectangular flatbed table. It is used in the design of cars, ships, aircrafts, buildings, highways etc. It is also known as Table Plotter.

4. Speaker - Speakers are one of the output devices used with computers. They are transducers that convert electromagnetic waves into sound waves.

5. Digital Projectors – Projector is a device that connects with a computer and projects the output onto a white screen or wall.

1. Which of the following is a computer hardware? (UIICL Assistant)
   (1) MS Windows  
   (2) MacOS  
   (3) Ubuntu  
   (4) Printer  
   (5) Unix

2. Keyboards convert characters to _______ code. (UIICL Assistant)
   (1) ASCII  
   (2) EBCDIC  
   (3) AMIS  
   (4) ISO Latin  
   (5) Binary Format

3. Which of the following refers to the time the alphanumeric key is to be held before the keyboard will repeat itself? (RRB PO)
   (1) Repeat Rate  
   (2) Keyboard Rate  
   (3) Alphanumeric Rate  
   (4) Key Rate  
   (5) Relay Rate

4. Which of the following is a power protection device that includes a battery providing power for a short period of time? (RRB PO)
   (1) ESD  
   (2) EMI  
   (3) SPIKE  
   (4) UPS  
   (5) Surge Suppressor

5. What is the name of the temporary data storage area between a peripheral device and CPU which compensates for the difference between their speeds? (RRB PO)
   (1) Backing Storage  
   (2) Buffer  
   (3) Main Storage  
   (4) Temporary Storage  
   (5) Permanent Storage

6. Which of the following printers cannot print graphics? (NABARD)
   (1) Ink Jet Printer  
   (2) Laser Printer  
   (3) Daisy Wheel Printer  
   (4) Both (1) & (2)  
   (5) All of the above
7. Which among the following options specifies this action: Holding the mouse button down while moving an object of text? (RBI Asst. Mains)

   (1) Highlighting  (2) Dropping  (3) Moving  (4) Dragging  (5) Clicking

**Answer keys**

1. (4)  2. (1)  3. (1)  4. (4)  5. (2)  6. (3)  7. (4)

**Solutions**

1. Computer "Hardware" refers the physical parts of the computer, and "software" refers to the code that runs on the computer. Printer is a hardware.

2. Keyboards convert characters to ASCII code.
   ASCII is the acronym for the American Standard Code for Information Interchange. It is a code for representing 128 English characters as numbers, with each letter assigned a number from 0 to 127. For example, the ASCII code for uppercase M is 77. Most computers use ASCII codes to represent text, which makes it possible to transfer data from one computer to another.

3. After you press and hold down a key on the keyboard, the key starts repeating itself. The speed at which it repeats is the repeat rate, which can be fast or slow.

4. UPS helps protect against potential electrical power problems by supplying a consistent level of electrical power to a computer or other device. The battery is constantly recharging while the UPS is in use. The UPS provides a consistent quality of power when brownouts and blackouts occur. Many UPS devices can communicate directly with the computer operating system. This communication allows the UPS to safely shut down the computer and save data prior to the UPS losing all electrical power.

5. Buffer is the temporary data storage area between a peripheral device and the CPU which compensates for the difference between their speeds.
   In computer science, a data buffer (or just buffer) is a region of a physical memory storage used to temporarily store data while it is being moved from one place to another. Typically, the data is stored in a buffer as it is retrieved from an input device (such as a microphone) or just before it is sent to an output device (such as speakers). However, a buffer may be used when moving data between processes within a computer. This is comparable to buffers in telecommunication.

6. Daisy-wheel printers cannot print graphics, and in general they are noisy and slow, printing from 10 to about 75 characters per second. As the price of laser and ink-jet printers has declined, and the quality of dot-matrix printers has improved, daisy-wheel printers have become obsolete.

7. Dragging the mouse refers to moving its position while holding the mouse button depressed. Dragging is used in the Plot window to move text items and to move the plot itself within the Plot window. To drag an object across a display screen, we usually select the object with a mouse button and then move the mouse while keeping the mouse button pressed down.
Operating System

An Operating System (OS) is a program that acts as an interface between a computer user and computer hardware. It performs all the basic tasks and controls the peripheral devices such as disk drives and printers.

Examples – Linux (Ubuntu), Windows (Windows XP, Windows 7, Windows 8, Windows 8.1, Windows 10), iOS, Chrome OS, DOS etc.

Apple’s latest operating system, macOS Mojave, version 10.14.

Layered Structure of Operating System

1. Kernel
2. Memory Management
3. Process Management
4. Device Management
5. File Management
6. Storage Management
7. User Interface

Functions of Operating systems

The operating system is the manager of all system resources. The functions of operating systems are:

- Memory Management
- Process Management
- Device Management
- File Management
- Storage Management
- Security
- Job Accounting
- Controls system performance
- Error detecting aids
- Coordination between other software and users

Memory Management - Memory management is the process of controlling and coordinating computer memory, conveying memory blocks to various running programs to enhance overall system performance.

Process Management – Process Management allocates the processor (CPU) to a process and deallocates the processor when a process is no longer essential. It can save the tracks of the processor and the status of the process.

Device Management – Device Management keeps track of all devices. This is called the Input/output controller and it decides which process gets the device, when, and for how long.

File Management – File Management allocates and de-allocates the resources. It keeps track of information, location, uses, status etc. The collective facilities are known as a file system.
Storage Management – Storage Management provides secondary storage to backup main memory. It can store all data and program permanently. Disk scheduling, Storage allocation, Free space management are the activities in Storage Management.

Security – Security controls the unauthorized access of programs, processes and data resources by means of passwords etc. It can be used to ensure that the files, memory segment, and other resources can be operated only by authorized users.

Job Accounting – It keeps track of time and resources used by various users and processes.

Control System Performance – Control System records delays between the request for a service and from the system.

Error Detecting Aids – Error detecting Aids ensure the consistent delivery of data across the network. Production of dumps, traces, error messages and other debugging etc are techniques that enable reliable delivery of digital data over unreliable communication channels.

Coordination between other software and users - Operating System Coordinates and assigns compilers, interpreters, assemblers and other software to the various users of the computer systems.

Types of Operating Systems

- Batch Operating System
- Multi-Programming Operating System
- Timesharing/Multitasking Operating System
- Distributed Operating System
- Real-Time Operating System
- Single-user operating System

Batch Operating System - The users of the batch operating system do not interact with the computer directly. Each user prepares his job on an off-line device like punch cards and submits it to the computer operator.

Disadvantages
- Lack of interaction between the user and the job
- The speed of the process is slow. Hence Output is time taking
- The CPU is in idle condition

Multiprogramming Operating System – The users of multiprogramming operating system can execute several programs simultaneously. The CPU keeps on processing. The processes which are running exist in main memory at a time.

Disadvantages
- The waiting time for the job is high
- Complicated schedule handling

Timesharing / Multitasking Operating System - Time-sharing or multitasking is a logical extension of multiprogramming. It is a technique which enables many people, located at various terminals, to use a computer system at the same time. The CPU executes multiple programs by switching among the programs. Unix is an example of timesharing OS.

Disadvantages
- Less Reliability
- Problem of Data Communication

Distributed Operating System – Distributed Operating System allows multiple users on different computers or terminals to access a single system with one Operating System on it. The processors communicate with one another through various communication lines. These are referred to as loosely coupled systems.

Advantages
- Potential Operation
- Better service to the customers.
- The load on the host computer is reduced
- Delays in data processing are reduced

Single User Operating System – This type of operating system supports a single user at any given time. Single keyboard and Single monitor are used for interaction. Several programs can also run by a single user in this operating system.
Example – Windows 95, Windows XP etc

Real-Time Operating System – It is a data processing system in which the time interval required to process and respond to inputs is small. It is always online whereas online system need not be real time. They are used in scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, air traffic control systems, etc.

Examples – VRTX, RT Linux, Lynx etc

There are two types of real-time operating systems.

✓ Hard real-time systems - In this system, the critical tasks complete on time. Secondary storage is limited, and the data is stored in ROM. Virtual memory is almost never found.
   Examples – Industrial control applications, Robots, etc

✓ Soft real-time systems - In this system, the time constraint is less strict. A critical real-time task gets priority and retains the priority until it completes. It has limited utility.
   Examples – Multimedia, Virtual reality, Advanced Scientific Projects like undersea exploration and planetary rovers, etc.

Advantages
✓ It can be used in an embedded system
✓ Error-free
✓ Better memory allocation

Disadvantages
✓ Algorithm is complex

Android - Android is the name of the operating system used on many smartphones and tablets. It is owned and maintained by Google. The recent version of Android is Android 9 Pie.

Other Terms related to Operating System

Booting - When the computer starts, the operating system is first loaded (as it is essential for running all other programs), this process is known as booting.

Cold Boot – Turn ON the computer from an OFF position is called Cold Booting.

Warm Boot - A computer system starts up/reset from a complete powerless state is called Warm Booting.

Firmware - Firmware is a software program that is written to a hardware device. It allows the hardware to be updated. The contents are saved when a hardware device is turned off or loses its external power source.

Middleware - Middleware is a software layer situated between applications and operating systems. It enables communication and data management for distributed applications.

1. The feature that opens a window on your desktop where you can browse for file stored on your computer is called as _________. (RRB PO)
   (1) Device Manager
   (2) File Explorer
   (3) Web Browser
   (4) Utility Software
   (5) None of the above

2. In MS-DOS 6.22, which part identifies the product uniquely? (RBI Asst. Mains)
   (1) MS
   (2) DOS
   (3) MS-DOS
   (4) None of these
   (5) 6.22

3. Each time you turn on your computer, it will check on the ______ control file. (RBI Asst. Mains)
   (1) Command.com
   (2) io.sys
   (3) msdos.sys
   (4) Both A & B
   (5) All the above

Answer keys

1. (2)  2. (5)  3. (5)
Solutions

1. File Explorer is a file browser found in every version of Microsoft Windows since Windows 95. It is used to navigate and manage the drives, folders, and files on your computer. The image below shows File Explorer in Windows 10.

2. MS stands for Microsoft, DOS is the name of operating system Disk Operating System, 6.22 is the version number that identifies the product. Microsoft DOS 6.22 was the last standalone version from Microsoft. It was also the last from Microsoft to run on an 8088, 8086, or 286.

3. command.com, io.sys and msdos.sys are the essential system files of MS-Dos. Loading these files from disk into memory is known as booting. Booting is the process of preparing your computer to work. IO.SYS is a hidden executable binary file or hidden system file which processes instructions when the operating system is booted.

Software

The software is a group of instructions that instructing a computer to do specific tasks. It enables the user to interact with a computer. System Software and Application Software are two types of software.

System Software

It serves as an interface between a computer user, computer hardware and application software. It is also known as background software. Four types of system software are the following.

✓ Operating System
✓ Utility Programs
✓ Device drivers
✓ Language translators.

Operating System - Operating system (OS) is the program that acts as an interface between the user and computer hardware and application software. After the boot program, OS manages all the other programs in a computer. Examples - Linux, Unix, Microsoft Windows XP etc.

Utility Programs - Utility Programs help to manage, maintain and control computer resources. They are also known as service programs. Examples of utility programs are antivirus software, backup software, disk defragment, backup, disk clean etc.

Device Drivers - A device driver is designed to enable interaction with hardware devices. It controls a device that is attached to your computer. Printers, Displays, CD-ROM readers, Disk drives etc are the examples of the device driver.

Language Translator – Language Translator translates the high-level language program (input) into an equivalent machine language program (output). It also detects and reports the error during translation. Assembler, Compiler, Interpreter are types of a Language Translator.

Assembler – It converts assembly language program into machine language.

Compiler – It converts the program in a high-level language into low-level language and reports all the errors of the program along with the line numbers. C, C++ use compilers.

Interpreter – It converts the programs in a high-level language to low-level language. It translates line by line and reports the error once after completing the translation process. It gives better error diagnostics than a compiler. Python, BASIC, and Ruby use interpreters.

Application Software

Application software is a program or group of programs designed for end users. It enables the user to complete tasks, such as creating documents, spreadsheets, databases, and publications, doing online research, sending email, designing graphics etc. There are two types of application software.

✓ Basic application software
✓ Specialized application software

Basic application software - Basic application software is also known as general purpose applications and productivity applications. These programs are widely used in every discipline and occupation. Word processors, spreadsheets, database management systems, and presentation graphics are the common types of basic application software. Example - Microsoft office 2016.
Specialized application software - Specialized application software is designed for a specific task rather for a wide application area. Graphics programs, audio and video editors, multimedia creation programs, web authoring, and virtual reality programs are common types of specialized software.

1. Bookmarks can be managed using ________. (RRB PO)
   (1) Bookmarks Manager (2) Extensions Manager (3) Cast
   (4) Find (5) Downloads Manager

2. Which among the following options is the line that describes the contents of the message while sending an e-mail? (RBI Asst. Mains)
   (1) Subject (2) Cc (3) Bcc
   (4) To (5) None of these

**Answer keys**

1. (1) 2. (1)

**Solutions**

1. Bookmarks Manager can manage bookmarks. Bookmark manager software saves and organizes web content and websites so users can refer to it later. Bookmark managers will either work alongside, or inside of, a web browser, allowing users to save web content and return to it later without opening another application.

2. Subject is a description of the topic of the message and displays in most email systems that list email messages individually. When entering the subject line be sure to include important information such as what the email is about. If we are too vague or don’t include any subject line at all, message could be mistaken for spam and deleted without ever being read.

**Computer Languages**

The different kinds of languages have been developed to perform various types of work on the computer. The two major types of programming languages are Low-Level Languages and High-Level Languages.

**Low-Level languages**

It is a programming language that deals with a computer’s hardware and its configuration. It is very close to the computer’s native language. It is further divided into Machine and Assembly languages.

**Machine Language** – It consists of binary digits or bits. It can directly understand by the computer and does not need a translator program. It is also called the machine code. It is efficient but difficult to learn.

**Advantages**

➢ Programs run fast.
➢ No translation program is required.

**Disadvantages**

➢ Difficult to program
➢ Debugging is also an issue

**Assembly Language** – A combination of letters and numbers forms the Assembly Language and a translator program is required to translate to the machine language. The operation codes and operands are given in the form of alphanumeric symbols which are known as mnemonic codes and can combine in a maximum of five-letter combinations e.g. ADD for addition, SUB for subtraction etc. This is also known as Symbolic Programming Language.
Advantages
➢ Easier to understand and minimizes effort.
➢ Finding and correcting the errors are easy.

Disadvantages
➢ It is machine dependent (program written for one computer might not run in other computers with different hardware configuration)
➢ Writing of code is time-consuming.

High-Level languages
A high-level language (HLL) is a programming language that enables a programmer to write programs independently. Such languages are closer to human languages. Higher level languages are simple languages that use English and mathematical symbols like +, -, %, / for its program construction.

Example – BASIC, C, C++, COBOL, FORTRAN, ALGOL, PASCAL, PROLOG.

BASIC - Beginner's All-purpose Symbolic Instruction Code (BASIC) was developed for students to write simple computer programs. It was designed by John Kemeney and Thomas Kurtz in 1963.

ALGOL - ALGOL is a short form of ALGOrithmic Language. It is a family of portable programming languages for scientific computations.

PASCAL - Prolol is used widely for artificial intelligence applications, particularly expert systems.

FORTRAN - It is a programming language designed for numeric computation and scientific computing. FORmula TRANslation is an acronym of FORTRAN.

COBOL - Common Business Oriented Language is the full form of COBOL. It is used for business and administrative purposes. It can be read like regular English.

C - It is a general-purpose language which is used in many scientific programming situations.

C++ - C++ is an object-oriented programming language and incorporates all the features offered by C.

Advantages
➢ Independent of machines and can run on any computer
➢ Problem-oriented rather than machine oriented
➢ User-friendly

Disadvantages
➢ Need time for translating.

Object-Oriented Programming
Object-oriented programming (OOP) is a software programming model built around objects. This model classifies data into objects and describes object contents and performance through the declaration of classes.

Simula is the first object-oriented programming language. The examples of object-oriented programming languages are Java, Python, JavaScript, C++, C#, PHP, Perl, .NET, Ruby, Curl, Visual Basic, Smalltalk, Delphi, and Eiffel.

Java - Java is used for developing Mobile, Desktop, web, server-side and dynamic web applications.

JavaScript – JavaScript is designed for styling HTML Pages, interactivity to HTML Pages, Server-Side Scripting Operation, executing query related to DB on Server.

Python - Python is a general-purpose programming language. It is used for developing complex scientific, numeric applications, data analysis, and visualization.

C# - C# is a general-purpose language was designed by Microsoft to be used for developing apps on the Microsoft platform.

PHP - PHP stands for Hypertext Pre-processor. It is a scripting language used for the development of web applications.

.Net-.Net is a programming framework developed by Microsoft, which can be used to build different types of applications such as Windows, Web application and Mobile based applications etc.

Visual Basic - Visual Basic is an approachable language with a simple syntax for building type-safe, object-oriented apps.
### Computer Languages

<table>
<thead>
<tr>
<th>Computer Languages</th>
<th>Father/Inventor/Designed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/C++</td>
<td>Dennis Ritchie</td>
</tr>
<tr>
<td>Java</td>
<td>James Gosling</td>
</tr>
<tr>
<td>JavaScript</td>
<td>Brendan Eich</td>
</tr>
<tr>
<td>PHP</td>
<td>Rasmus Lerdorf</td>
</tr>
<tr>
<td>Python</td>
<td>Guido van Rossum</td>
</tr>
<tr>
<td>HTML</td>
<td>Tim Berners-Lee</td>
</tr>
<tr>
<td>.NET (Framework)</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>C#</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>Perl</td>
<td>Larry Wall</td>
</tr>
<tr>
<td>Ruby</td>
<td>Yukihiro Matsumoto</td>
</tr>
</tbody>
</table>

### Other related terms

**Language Processor** – Language Processor is a software designed to perform tasks such as processing program code to machine code. Language processors are found in languages such as Fortran and COBOL.

**Debugger** - A debugger is a software utility that is designed to locate errors within a program's source code.

**Linker** - Linker is a program that combines object modules to form an executable program.

**Loader** – Loader brings all program objects into the memory which is essential to run a program.

**Spooling** - Spooling is a process in which data is temporarily held to be used and executed by a device, program or the system. Data is saved in storage until the program requests it for execution.

### Memory Storage Units

<table>
<thead>
<tr>
<th>S.No</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bit (Binary Digit)</td>
<td>A binary digit is the smallest unit. It has the logical representation of 0 and 1.</td>
</tr>
<tr>
<td>2</td>
<td>Nibble</td>
<td>A group of 4 bits is called nibble.</td>
</tr>
<tr>
<td>3</td>
<td>Byte</td>
<td>A group of 8 bits is called byte. (1 byte = B bits)</td>
</tr>
<tr>
<td>4</td>
<td>Word</td>
<td>A computer word is a group with a fixed number of bits processed as a unit. The length of a computer word is called word-size or word length and it may be either 8 bits or 96 bits. A computer stores the information in the form of computer words.</td>
</tr>
</tbody>
</table>

### Memory Capacity Conversion Chart

<table>
<thead>
<tr>
<th>Term</th>
<th>Approximate Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte (B)</td>
<td>8 bits</td>
</tr>
<tr>
<td>Kilobyte (KB)</td>
<td>1024 bytes / 10^3 bytes</td>
</tr>
<tr>
<td>Megabyte (MB)</td>
<td>1024 KB / 10^6 bytes</td>
</tr>
<tr>
<td>Gigabyte (GB)</td>
<td>1024 MB / 10^9 bytes</td>
</tr>
<tr>
<td>Terabyte (TB)</td>
<td>1024 GB / 10^12 bytes</td>
</tr>
<tr>
<td>Petabyte (PB)</td>
<td>1024 TB / 10^15 bytes</td>
</tr>
<tr>
<td>Exabyte (EB)</td>
<td>1024 PB / 10^18 bytes</td>
</tr>
</tbody>
</table>
### Bit – Binary Digit has the logical representation of 0 and 1.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zettabyte (ZB)</td>
<td>1024 ES/ 10^{21} bytes</td>
<td></td>
</tr>
<tr>
<td>Yottabyte (YB)</td>
<td>1024 ZB/ 10^{24} bytes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB (Kilobyte)</td>
<td>1024 Bits</td>
<td>1024 KB</td>
</tr>
<tr>
<td>MB (Megabyte)</td>
<td>1024 KB</td>
<td></td>
</tr>
<tr>
<td>GB (Gigabyte)</td>
<td>1024 MB</td>
<td></td>
</tr>
<tr>
<td>TB (Terabyte)</td>
<td>1024 GB</td>
<td></td>
</tr>
<tr>
<td>PB (Petabyte)</td>
<td>1024 TB</td>
<td></td>
</tr>
<tr>
<td>EB (Exabyte)</td>
<td>1024 PB</td>
<td></td>
</tr>
</tbody>
</table>

1. Which of the following arrangements is correctly places in ascending order? (UIICL Assistant)
   - (a) KB < MB < GB < TB
   - (b) Byte < MB < EB < PB
   - (c) Nibble < KB < MB < PB
   - (1) Only (a)
   - (2) Only (b)
   - (3) Only (c)
   - (4) Both (a) & (b)
   - (5) Both (a) & (c)

**Solution**

1. Bit < Nibble < Byte < KB < MB < GB < TB < PB < EB < ZB < YB

---

### Number System

The Number system is a technique to represent and work with numbers. The most widely adopted number system is the Decimal number system which has 10 digits (0-9). Binary number system (0,1), Octal number system (0-7) and Hexadecimal number system (0-9, A, B, C, D, E, F) are other number systems.

The number of digits in a system is called ‘radix’ or ‘base’. The base of decimal, binary, octal hexadecimal system is 10, 2, 8 and 16 respectively.

**Comparison of Decimal, Binary, Octal and Hexadecimal system.**

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Binary</th>
<th>Octal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0001</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0010</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>0011</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>0100</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>0101</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>0110</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>0111</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>1000</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>1001</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>1010</td>
<td>12</td>
<td>A</td>
</tr>
<tr>
<td>11</td>
<td>1011</td>
<td>13</td>
<td>B</td>
</tr>
</tbody>
</table>
Logic Gates

These are the building blocks of any digital circuit that implement Boolean logic processes. It has only one output. Arrays of logic gates are used in digital integrated circuits (ICs). The basic logic gates and their functioning (truth table) are mentioned in the following figure.

**AND Gate**

It is a digital logic gate with two or more inputs and one output which performs logical conjunction.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**OR Gate**

It is a logic gate that produces inclusive disjunction. It is used in Boolean algebra and electronic circuits like transistor-transistor logic, and complementary metal-oxide semiconductors etc.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>A+B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOT Gate**

NOT gate is a single input gate. It performs the inversion of given input. So, it is called Inverter.

<table>
<thead>
<tr>
<th>A</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
NAND Gate
It is the combination of AND & NOT gates. It is the opposite of AND logic gate.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>( \overline{A \cdot B} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

NOR Gate
It is the combination of NOT & OR gates. ‘neither this nor that’ is the principle of NOR gate.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>( \overline{A + B} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

XOR Gate
XOR gate is a special type of gate. It is used in the half adder, full adder and subtractor and controlled inverter circuit. It is also used in the computers for implementing the binary addition.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>( A \oplus B )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
XNOR Gate

It is a combination of the Exclusive-OR gate and the NOT gate. The EXOR gate has a high output only when an odd number of inputs are high.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>A \ XOR B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Database Management System

A database management system (DBMS) is a computer program designed for creating and managing the database. It provides a systematic way to run operations like creating, storing, retrieving, deleting data from the database. It serves as an interface between the database and end users. It also provides protection and security to the databases.

MySQL, Oracle, SQL Server, IBM DB2, PostgreSQL, Amazon Simple DB (cloud-based) are some popularly used DBMS.

Advantages of DBMS
✓ Reduced Data redundancy
✓ Data security and consistency
✓ Easily accessible
✓ Integrity constraints

Disadvantages of DBMS
✓ Larger in size
✓ Complexity
✓ Licensed DBMS are costly

Architecture (Levels of Data Abstraction in DBMS)

Database systems consist of complex data structures. The process of masking irrelevant information from users is known as Data Abstraction. Data abstraction reduces the complexity of users with the database. Three levels of data abstraction are Physical Level, Logical Level, and View level.

The Architecture of commercial DBMS is based on ANSI-SPARC database architecture.
Physical Level/Internal Level - It is the lowest level of abstraction. It describes how the data is physically stored in detail. B+ tree, Hash file organization methods are used in this level.

Logical Level/Conceptual Level - It is the next level of abstraction and describes what data is stored and what is the relationship among that data. At the logical level, each record is described by a type and the interrelationship of these record types. Database administrators work at this level of abstraction. The changes which are done at this level will not affect the external or physical levels of data.

View Level/External Level - It is the highest level of abstraction and is viewed by the user in terms of tables and relations. It describes only a part of the entire database and hides the details of the logical level.

**Keys in DBMS**

A key is a field in the database table which is used to retrieve and sort rows in the table. Keys are used to speeding up the data accessing and creating links between different tables.

**Super Key** - It is a set of one or more attributes whose values uniquely determine each entity in the database table. It is a subset of a candidate key.

**Candidate Key** - It is a set of columns in the table from which primary key can be selected to identify each record. Every database table may have one or more candidate keys.

**Primary Key** - It is a special key that uniquely identifies each record in the table. It has a unique value for each row of data and it cannot contain null values.

**Composite Key** - It is a combination of more than one column in the table that can be used to uniquely identify each record. It is also known as a Compound key.

**Alternate Key** - All keys except primary key are known as Alternate. Alternate keys are also called Secondary Keys.

**Foreign Key** - Foreign key points to the primary key of another table. It acts as a reference between tables. It can accept the null and duplicate value.

**Microsoft Office**

It is an office suite of inter-related desktop applications, servers and services for the Windows operating systems introduced by Microsoft in 1989. Some important application software of the MS Office is MS Word, MS Excel, MS Power-point, MS Access, MS OneNote, MS Outlook etc.

**Microsoft Word**

Microsoft Word is a word processing program that was first made public by Microsoft. It is one of the most widely used word processors available for Macs and PCs. It offers a variety of features such as creating, editing and formatting etc. Some other features include spell check, mail merge and link embedding. Another feature is word wrapping, which means that the processor automatically adjusts all text within the specified margins. `.doc` and `.docx` are the file extension of MS word.

**Title Bar**

The title bar is located at the top of a window that displays the name of the window or document being used.

**Quick Access Tool Bar**

The quick access toolbar is a small and customizable toolbar at the top of the document window. It contains a set of commands that are independent of the tab on the ribbon that is currently displayed. It usually contains buttons to save, undo, redo and print.

**Ribbon**

The Ribbon is a cluster of toolbars in Microsoft Office which are used for writing, designing, formatting and reviewing different styles, adaptations, add-ins, themes etc. Every tab in the top of a given word file window displays the Ribbon toolbar.

The following are the specifications of MS office 2016 version.

**File Menu**

The File menu is a section on the Office ribbon that gives access to file functions such as Open, Save, Close, Properties, and Recent file options. Type of file (i.e. Text file, Word file, HTML file, etc.), file name, size of the file, file location, security on the file, time and date of creation, modification of the file can also be accessed by anyone.
Home Tab
The Home tab is the default tab in Microsoft Word, Microsoft Excel, Microsoft PowerPoint and other Microsoft Office products. It allows changing document settings, such as the font properties by using control groups on the tab. The control groups and keys are
✓ Clipboard Group (Copy (only one item at a time), Paste, Cut, Format Painter)
✓ Font Group (Font style, colour & size, Bold, Underline, Strikethrough)
✓ Paragraph Group (Bullets & Numbering, Alignment, Shading, Borders, Line spacing)
✓ Style Group (Listed Styles)
✓ Editing Group (Find, Replace etc).

Insert Tab
The Insert Tab is used to insert different features such as tables, pictures, clip art, shapes, charts, page numbers, word art, headers, and footers etc into a document. The availed groups and keys under this tab are:
✓ Pages Group (Cover page, Blank page, Page break)
✓ Tables Group (Tables)
✓ Illustrations Group (Pictures, Shapes, Smart Art etc)
✓ Media and Links Group (Hyperlink, Bookmark etc)
✓ Header and Footer Group (Page number, Header, Footer)
✓ Text Group (Text Box, Word Art etc)
✓ Symbol Group (Equation, Symbol)

Design Tab
Design Tab includes Themes (to change colours, fonts and effects for the document all at once), The Style Set gallery (to change the styles), Paragraph Spacing, Effects, The Page Background group (watermark, page colour, page borders) buttons to format the document.

Layout Tab
The Layout Tab holds the buttons which are used to arrange document pages. The control groups and keys under layout tabs are:
✓ Page Setup Group (Margins, Orientation, Breaks, Line numbers, Hyphenation, Size of the page, Columns)
✓ Paragraph Group (Paragraph Indentation, Spacing)
✓ Arrange Group (Align, wrap text, Rotate etc)

References Tab
References Tab allows to now create a table of contents, footnotes, citations, cross-references. The availed control groups and keys in this tab are:
✓ Table of Contents Group (Customize table of contents)
✓ Footnotes Group (Insert footnotes)
✓ Research Group (Smart outlook of the text)
✓ Citations & Bibliography Group (Inserting and choosing a style of citation, Bibliography)
✓ Captions group (cross reference, insert a table of figures, Insert Caption)
✓ Index Group (Insert Index, Mark entry)
✓ Table of Authorities group (Insert Index, Mark entry)

Mailings Tab
Mail Merging is an ideal task in MS word by using Mailings Tab. Mail merge is used to create form letters or address labels, certificates with unique names, and more. The following group buttons are available in Mailings Tab.
✓ Create Group (Envelops, Labels)
✓ Start Mail Merge Group (Start Mail Merge, Selection of Recipients, Edit Recipient List)
✓ Write & Insert Fields Group (Highlighting the fields, Address Block, Greeting Line etc)
✓ Preview Results Group (Check for errors, Find Recipient)
✓ Finish Group (Finish & Group)
Review Tab
The tools in the Review Tab helps to improve the document. It contains the following control groups and keys.
✓ Proofing Group (Spelling & Grammar, Thesaurus, Autocorrect, word count)
✓ Comments Group (Add new comment, show comment, Delete comment)
✓ Tracking Group (Track changes, Simple mark-up, Review pane)
✓ Changes Group (Accept or Reject changes)
✓ Compare Group (Comparing the documents)
✓ Protect Group (Restrict editing, Block Authors)

View Tab
The View tab has the functionality to change the document views. The options in the view tab are:
✓ Views Group (Read mode, Print Layout, Web Layout Outline, Draft)
✓ Page Movement Group (Vertical and Side to side)
✓ Show Group (Ruler, Gridline, Navigation Pane)
✓ Zoom Group (Zoom {10% to 500%}, Page width, Multiple pages)
✓ Window Group (New window, Arrange and Split window, Switch windows etc)
✓ Macros group

Help Tab
The users can get help by using F1 function key anytime, Help tab and ‘Tell me what you want to do’.

Status Bar
A status bar is a horizontal window at the bottom of a parent window. It displays the various kinds of status information of the document.

Dialog Box Launcher
A button in the corner of a group that launches a dialog box containing all the options within that group.

View Toolbar
A toolbar that enables, adjusts and displays different views of a document. It is located at the bottom left corner of the window.

Other Terms
Alignment – This option is used to align the text in a document adhere to the right side, left, centre or justified.
Clipboard – The clipboard saves the text temporarily. Using the Cut or Copy commands will place the text in the clipboard.
Font – It is a type of design for text. Times New Roman, Arial, Calibri, Verdana etc are the examples of font style. The maximum size of Font is 72 in a drop-down selection of MS Word.
Undo and Redo – Undo refers to delete the last action in the document. Redo can restore the changes again.
Footer and Header - The footer constantly appears on every page of a document, at the bottom of each page. It includes the page number, or a company’s name and contact details in formal documents. The header sits at the very top of every page in a document. A Header contains page numbers, the document name or sub-titles within a document.
Cut, Copy, Paste - Cut is used to move a section of text from a document to clipboard. Copy refers to duplicating a section of a document and placing it in the clipboard. Paste allows to copy an object or text from one location and place it to another location.
Paste Special - Paste Special is used to paste an item from the clipboard with custom formatting.
Thesaurus - It is a software tool which is in MS Word that provides synonyms for selected words on command.
AutoCorrect - AutoCorrect is a software feature in MS Word. It automatically corrects misspellings and common errors.
Spell Check - It is a software tool for correcting spelling. It is available in word processing programs, email programs, cell phones, and a variety of other applications.
### Microsoft Excel

It is a spreadsheet program which is used to present and organise copious amounts of data in a systematic manner. It also includes performs basics arithmetic operations on data and creates graphs and charts based on the same. ‘.xls’ is the file extension of the MS Excel. Ribbons in MS Excel are divided into logical groups called Tabs and Each tab has its own set of unique function to perform. There are various tabs – Home, Insert, Page Layout, Formulas, Date, Review and View.

The following are the features of MS Excel 2016.

#### Home Tab

The Excel Home Tab is used to perform common commands such as bold, underline, alignment, Number, copy, and paste. It is also used to apply formats to cells in a worksheet. The Home Tab groups and their buttons are:

---

<table>
<thead>
<tr>
<th>Keys</th>
<th>Description</th>
<th>Keys</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctrl + A</td>
<td>Select All</td>
<td>Shift+F7</td>
<td>Thesaurus</td>
</tr>
<tr>
<td>Ctrl + B</td>
<td>Bold</td>
<td>F1</td>
<td>Help</td>
</tr>
<tr>
<td>Ctrl + C</td>
<td>Copy</td>
<td>F5</td>
<td>Refresh the page</td>
</tr>
<tr>
<td>Ctrl + V</td>
<td>Paste</td>
<td>F4</td>
<td>Repeat the action</td>
</tr>
<tr>
<td>Ctrl + N</td>
<td>New Blank Document</td>
<td>F7</td>
<td>Spell Check</td>
</tr>
<tr>
<td>Ctrl + X</td>
<td>Cut</td>
<td>F6</td>
<td>Go to the next pane</td>
</tr>
<tr>
<td>Ctrl + I</td>
<td>Italic</td>
<td>F8</td>
<td>Extend the selection</td>
</tr>
<tr>
<td>Ctrl + U</td>
<td>Underline</td>
<td>F9</td>
<td>Update the selected fields</td>
</tr>
<tr>
<td>Ctrl + Z</td>
<td>Undo</td>
<td>F10</td>
<td>Show Key tips</td>
</tr>
<tr>
<td>Ctrl + Y</td>
<td>Redo</td>
<td>F11</td>
<td>Go to the next field</td>
</tr>
<tr>
<td>Ctrl + O</td>
<td>Open</td>
<td>F12</td>
<td>Save As</td>
</tr>
<tr>
<td>Ctrl + S</td>
<td>Save</td>
<td>Shift + F3</td>
<td>Change the case of letters</td>
</tr>
<tr>
<td>Ctrl + K</td>
<td>Insert Hyperlink</td>
<td>Shift + F4</td>
<td>Repeat a find</td>
</tr>
<tr>
<td>Ctrl + L</td>
<td>Left Alignment</td>
<td>Shift + F10</td>
<td>Display a shortcut menu</td>
</tr>
<tr>
<td>Ctrl + E</td>
<td>Centre Alignment</td>
<td>Ctrl + F2</td>
<td>Choose Print Preview</td>
</tr>
<tr>
<td>Ctrl + R</td>
<td>Right Alignment</td>
<td>Ctrl + F4</td>
<td>Close the window</td>
</tr>
<tr>
<td>Ctrl + J</td>
<td>Justify the alignment</td>
<td>Ctrl + F10</td>
<td>Maximize the document window</td>
</tr>
<tr>
<td>Ctrl + F</td>
<td>To open find box</td>
<td>Ctrl + F12</td>
<td>Choose the open button</td>
</tr>
<tr>
<td>Ctrl + G</td>
<td>Find and Replace</td>
<td>Tab</td>
<td>To move to the previous object</td>
</tr>
<tr>
<td>Ctrl + W</td>
<td>Close document</td>
<td>Alt + F5</td>
<td>Restore the program window</td>
</tr>
<tr>
<td>Ctrl + M</td>
<td>Indent</td>
<td>Alt + F7</td>
<td>Find the next misspelling</td>
</tr>
<tr>
<td>Ctrl + P</td>
<td>Print</td>
<td>Alt + F10</td>
<td>Maximize the program window</td>
</tr>
<tr>
<td>Ctrl + Shift + &gt;</td>
<td>Increase font size</td>
<td>F2</td>
<td>Rename the file</td>
</tr>
<tr>
<td>Ctrl + Shift + &lt;</td>
<td>Decrease font size</td>
<td>Alt + F4</td>
<td>Exit</td>
</tr>
<tr>
<td>Alt + H</td>
<td>Home Tab</td>
<td>Alt + P</td>
<td>Layout Tab</td>
</tr>
<tr>
<td>Alt + N</td>
<td>Insert Tab</td>
<td>Alt + Q</td>
<td>Tell me box</td>
</tr>
<tr>
<td>Alt + G</td>
<td>Design Tab</td>
<td>Alt + R</td>
<td>Review Tab</td>
</tr>
<tr>
<td>Alt + F</td>
<td>File Page</td>
<td>Alt + W</td>
<td>View Tab</td>
</tr>
<tr>
<td>Alt + M</td>
<td>Mailings Tab</td>
<td>Alt + S</td>
<td>Reference Tab</td>
</tr>
</tbody>
</table>
---
✓ **Clipboard Group** (Paste, Cut, Copy, Format Painter)
✓ **Font Group** (Bold, Italic, Underline, Font Style, Colour & Size {decrease and increase}, Fill colour, Borders)
✓ **Alignment Group** (Alignment {Top, Middle, Bottom, Left, Right, Centre}, Orientation, wrap text, Merger& Centre, Indent decrease & increase)
✓ **Number Group** (General, Accounting Number Format, Percent style, Comma style, Increase and decrease decimal)
✓ **Styles Group** (Conditional Formatting, Format as Table, Cell Styles)
✓ **Cells Group** (Insert cells, Delete cells, Format cells)
✓ **Editing Group** (AutoSum, Fill, Clear the format, Sort& Filter, Find & Select)

**Insert Tab**

Insert Tab is used to insert the picture, charts, filter, hyperlink etc. Alt+N is the shortcut Key to open Insert Tab. The Insert Tab groups and keys are:
✓ **Tables Group** (Pivot Table, Recommended Pivot Tables, Table)
✓ **Illustrations Group** (Pictures, Online pictures, Icons, Shapes, Smart Art Graphic, 3D models, Screenshot)
✓ **Add-ins Group** (Store, Insert Add-ins)
✓ **Charts Group** (Recommended charts, Maps, Pivot Chart Charts*)
✓ **Tours Groups** (3D Maps)
✓ **Sparklines Group** (Line, Column, Win/Loss)
✓ **Links Group** (Hyperlink)
✓ **Text Group** (TextBox, Header & Footer), WordArt, Signature line, Object
✓ **Symbols Group** (Equation and Symbol)

*Charts – There are eight types of charts. Column or Bar Chart, Hierarchy Chart, Line or Area Chart, Combo Chart, Statistic Chart, Bubble Chart, Pie Chart, Waterfall, Funnel, Stock, Surface or Radar Chart.

**Page Layout Tab**

The features under this tab used to change the look of a workbook. The groups under this tab are:
✓ **Themes Group** (Themes, Colours, Fonts, Effects)
✓ **Page Setup Group** (Margins, Orientation, Size, Print Area, Breaks, Background, Print Titles)
✓ **Scale to fit Group** (Page scale, Width and Height)
✓ **Sheet Options Group** (Gridlines, Headings)
✓ **Arrange Group** (Bring Forward, Send Backward, Align, Group, Rotate, Selection Pane)

**Formulas Tab**

Formulas Tab is used to make dynamic reports by using functions. In excel, 461 functions are availed from Office 2003 to 2013. Formulas Tab is divided into four groups.
✓ **Function Library** (Insert Function, AutoSum, Financial & Logical Function, Date &Time, Math& Trig, Lookup &Reference, Text, More functions {Statistical, Engineering, Cube etc})
✓ **Defined Names group** (Name Manager, Define Name, Use in Formula, Create from selection)
✓ **Formula Auditing** (Trace Precedents & Dependents, Error Checking, Evaluate Formula, Watch window)
✓ **Calculation Group** (Calculate sheet, options)

**Data Tab**

Data tab is used for importing a large amount of data. Importing Data can be done by connecting with the server, automatically from the web, MS Access etc. It makes easy to read vast data.
✓ **Get & Transform Data Group** (Get Data, From Text/CSV, Web, Table/Range, Existing Connections)
✓ **Queries & Connection Group** (Refresh All, Properties, Edit Links, Queries, Connections)
✓ **Sort & Filter Group** (Sort, Filter, Reapply, Clear, Advanced)
✓ **Data Tools Group** (Text to columns, Flash Fill, Remove Duplicates, Data Validation, Consolidate, Manage Data Mode, Relationships)
✓ Forecast Group (What-If Analysis, Forecast Sheet)
✓ Outline Group (Group, Ungroup, Subtotal)

Review Tab
It contains the editing feature, comments, track changes and workbook protection options. It makes to share the data easily with the proper information and ensuring the security of data.
✓ Proofing Group (Spell Check, Thesaurus)
✓ Language Group (Translate)
✓ Comments Group (Comment – New, Delete, Previous, Next, Hide/Show)
✓ Protect Group (Protect Sheet, Protect Workbook, Allow Edit Ranges, Unshared workbook)
✓ Ink Group (Start Inking, Hide Ink)

View Tab
View tab helps to change the view of an Excel sheet and make it easy to view the data. This tab is useful for preparing the workbook for printing. The groups and keys under this tab are
✓ Workbook Views Group (Normal, Page Break Preview, Page Layout & Custom View)
✓ Zoom Group (Zoom {range – 10% to 400%}, Zoom to selection)
✓ Window Group (New Window, Arrange All, Freeze Panes, View side by side, SynchronousScrolling, Reset Window, Show/Hide, Switch Windows)
✓ Macros Group (Macros)

Help Tab
The user can get help using this tab, by pressing F1 Key.
✓ Help & Support Group (Help, Contact Support, Feedback, Show Training, What’s New)
✓ Community Group (Community, Blog Site, Suggest a Feature)

Other Terms
Workbook – It is an Excel file which contains worksheets of rows and columns.
Worksheet – A single document or sheet in a workbook which is used to store and work with data. It consists of rows and columns. In Excel 2016, Default worksheet in a workbook is one.
Row & Column Headings – It indicates the number of rows (Left of the worksheet) and alphabet of column (Top of the worksheet). The total number of rows is 1,048,576 and columns is 16,384 in the new version of Excel sheet. Column width is 255 characters and row height is 409 points.
Cell – Cell is a box which is the intersection of a row and column in a worksheet. It is the smallest block of the spreadsheet. The cell in which the user working is known as Active Cell. The maximum number of line feeds per cell is 253 in the new version of Excel.
Cell Address – The location of a cell is known as Cell Address. Example: C10 (Column: Row)
Autofill – Autofill fills the values in the cell according to a given pattern. (i.e. Months & Days, Even Numbers, Odd Numbers, tens, etc) This is done through the Fill Handle.
Formula – It is an expression which calculates the value of a cell. It always starts with a ‘=’.
Formula Bar – It is located just below the ribbon. It shows the contents of the active cell and allows to create and view formulas.
Pivot Table – Pivot Table is an interactive report creation system. It is used to reorganize and summarize the data.
Flash Fill – Flash Fill is used to identify the patterns in existing data. It copies only required data from one column to another.
Freeze Panes – It is used to freeze rows/columns in place and making it visible when scrolling. Example – Header row visible
Macro – It is a sequence of instructions that replace a repetitive series of keyboard and mouse actions to execute. It is used in MS Word and MS Excel.
Status Bar – It is the Bar below the worksheet names that has a few buttons and indicators.
Wrap Text – When text exceeds a column width/Height, wrap text automatically adjust the height/width of a cell to make all text visible.
Sparklines – They are graphs that can fit into one cell and gives the information about the data.
Shortcut Keys

<table>
<thead>
<tr>
<th>Keys</th>
<th>Description</th>
<th>Keys</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2</td>
<td>Edit active cell</td>
<td>Shift + F11</td>
<td>Insert new worksheet</td>
</tr>
<tr>
<td>F5</td>
<td>Go to Dialog box</td>
<td>Shift + F9</td>
<td>Calculate the active worksheet</td>
</tr>
<tr>
<td>F9</td>
<td>Calculate worksheets</td>
<td>Ctrl + Shift + ;</td>
<td>Time</td>
</tr>
<tr>
<td>F4</td>
<td>Create an absolute</td>
<td>Ctrl + ;</td>
<td>Date</td>
</tr>
<tr>
<td>Tab</td>
<td>Right one Cell</td>
<td>F11</td>
<td>Create Chart</td>
</tr>
<tr>
<td>Shift + Tab</td>
<td>Left One Cell</td>
<td>Ctrl + Shift + U</td>
<td>Expand/Collapse formula bar</td>
</tr>
<tr>
<td>Ctrl + Home</td>
<td>To first Cell</td>
<td>Alt + =</td>
<td>Insert AutoSum formula</td>
</tr>
<tr>
<td>Ctrl + End</td>
<td>To Last Cell</td>
<td>Ctrl + ~</td>
<td>Show/hide all formula</td>
</tr>
<tr>
<td>Shift + Spacebar</td>
<td>Select entire row</td>
<td>Ctrl + Shift + @</td>
<td>Apply the time format</td>
</tr>
<tr>
<td>Ctrl + Spacebar</td>
<td>Select entire column</td>
<td>Ctrl + Shift + #</td>
<td>Apply the date format</td>
</tr>
<tr>
<td>Ctrl + 9</td>
<td>Hide selected rows</td>
<td>Ctrl + Shift + %</td>
<td>Apply the percentage format without decimal</td>
</tr>
<tr>
<td>Ctrl + 0</td>
<td>Hide selected columns</td>
<td>Ctrl + Shift + $</td>
<td>Apply the currency format with two decimals</td>
</tr>
<tr>
<td>Arrow Keys</td>
<td>Move between Cells</td>
<td>Alt + Enter</td>
<td>Start a new line in the same cell</td>
</tr>
<tr>
<td>Alt + Spacebar</td>
<td>Display control Menu</td>
<td>Ctrl + Shift + Home</td>
<td>Extend the selection of the cells</td>
</tr>
<tr>
<td>F1</td>
<td>Create Pivot Chart</td>
<td>Alt + F1</td>
<td>Create Pivot Chart in the same worksheet</td>
</tr>
</tbody>
</table>

Microsoft PowerPoint

MS PowerPoint is a popular presentation program and is used to create slideshows which comprise text, graphics, sounds and other animated media. Features such as word art, auto shapes etc. can also be added to the presentation. It is convenient for both school and office level work. ‘.ppt’ is the file extension of MS PowerPoint. The Ribbons in MS Powerpoint 2016 are divided into following tabs.

Home Tab

The Home Tab includes the commands for formatting presentations. The Keys and Groups under the Home Tab are:

- **Clipboard Group** (Cut, Copy, Paste, Format Painter)
- **Slides Group** (New slide, Layout, Reset, Section)
- **Font Group** (Font Style & size {Max. size is 96 in dropdown selection}, Text Shadow, Bold, Underline, Italic, Strikethrough, Clear All Formatting, Character Spacing, Change case)
- **Paragraph Group** (Bulleting, Numbering, Align Text, Text direction, Convert to SmartArt)
- **Drawing Group** (Shapes, Arrange, Quick Styles, Shape Fill, Shape Outline, Shape Effects)
- **Editing Group** (Find, Replace, Select)

Insert Tab

It is used to add features such as tables, pictures, clip art, shapes, charts, word art, or headers, and footers into a presentation. The groups and buttons in this tab are:

- **Slides Group** (New Slide)
- **Tables Group** (Draw/Add Table)
- **Images Group** (Pictures, Online Pictures, Screenshot, Photo Album)
- **Illustrations Group** (Shapes, Icons, 3D models, Smart Art, Chart)
- **Add-ins Group** (Store, Add-ins)
Design Tab
The Design tab holds commands related to the presence of slides like page setup and slide orientation. The group and Keys under this tab are:
- **Themes Group** (Listed Slide Themes)
- **Variants Group** (Listed Variants)
- **Customize Group** (Slide Size, Format Background)
- **Designer Group** (Design Ideas)

Transition Tab
Transitions tab is used to add transitions to a slide and to customize transition effects. The group and Keys of Transition Tab are:
- **Preview** (to view slides)
- **Transition to this slide** (Listed transition, Effect options)
- **Timing Group** (Sound in slides, Duration, Apply to all slides, Advance slide)

Animation Tab
It is used to add animation to text in a slide and to manage the animation order. The Groups and Keys are:
- **Preview Group** (Slide’s Preview)
- **Animation Group** (Listed Animation, Effect Options)
- **Advanced Animation** (Add Animation, Animation Pane, Trigger, Animation Painter)
- **Timing Group** (Start, Duration, Delay of slides, Reorder Animation)

Slideshow Tab
This tab is used to finalize the slideshow details, timings, and more. The Keys and groups under this tab are:
- **Start Slide Show Group** (From Beginning, From Current Slide, Present Online, Custom Slideshow)
- **Set up Group** (Set up slideshow, Hide slide, Rehearse timings, Record Slide Show)
- **Monitors Group**

Review Tab
Review tab is used to check spelling, to collaborate by adding comments, and to access editor tools. The groups are:
- **Proofing Group** (Spelling, Thesaurus)
- **Language Group** (Translate, Language)
- **Comments Group** (New comment, Delete Previous/next Comment)
- **Compare Group** (Compare, Accept, Reject, End Review, reviewing Pane)
- **Ink Group** (Start inking, Hide ink)
- **OneNote Group** (Linked Notes)

View Tab
View tab is used to access the various presentation views, to show and hide the ruler and grid lines, and more.
- **Presentation Views Group** (Normal, Outline view, Slide Sorter, Notes Page, Reading view)
- **Masters View Group** (Slide Master, Handout Master, Notes Master)
- **Show Group** (Ruler, Gridlines, Guides, Notes)
- **Zoom Group** (Zoom {10% to 400%}, Fit to the window)
- **Colour/Grayscale Group** (Colour, Grayscale, Black &White)
- **Window Group** (New window, Arrange All, Cascade, Move Split)
**Other Terms**

**Presentation** – A Presentation is a collection of individual slides that contain information on a topic with audio, visual features. It makes an interaction between a speaker and an audience.

**Design Template** - A PowerPoint template is a pattern of a slide whose format and colour scheme is used as the basis for other presentations. It can contain layouts, theme colours, theme fonts, theme effects, background styles, and even content.

**Master Slide** – A slide that controls the properties such as theme, layout, background, colour, fonts, and positioning of all other slides in a presentation.

**Normal View** - Normal view is used for creating, editing and viewing presentation slides. It contains all three view panes such as Slides, Outline and Notes.

**Greyscale** - Grayscale is a variety of shades of grey (Black and white combination) without apparent colour.

**Notes Pane** - It is used to add notes and graphics that apply to the current slide in the presentation. It is also used to print the notes.

**Slides Pane** – Slide Pane displays the slides thumbnails. It allows the user to view and edit the slides.

**Outline Pane** – Outline Pane displays the text from the slides.

**Slide Show View** – It is used to display the presentation. It is the way to preview the presentation.

**Slide Sorter View** – It shows all the slides in a presentation as thumbnails. It is used to reorganize, insert, delete and copy the presentation slides.

**Slide Timing** – It is the time period that a slide seems on the screen.

**Task Pane** – It allows to access commands like getting started, PowerPoint help, slide, new presentation etc related to a specific task.

**AutoContent Wizard** - A wizard helps to create a presentation. It helps with a general structure and suggested topics based on the user’s view regarding the presentation output.

**Shortcut Keys**

<table>
<thead>
<tr>
<th>Keys</th>
<th>Description</th>
<th>Keys</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt + W, Q</td>
<td>Change the zoom</td>
<td>Alt + N, X</td>
<td>Insert textbox</td>
</tr>
<tr>
<td>Alt + H, F and S</td>
<td>Change the font size</td>
<td>Alt + N, W</td>
<td>Insert word art</td>
</tr>
<tr>
<td>Alt + G, H</td>
<td>Select a theme</td>
<td>Ctrl + D</td>
<td>Duplicate Slide</td>
</tr>
<tr>
<td>Alt + H, L</td>
<td>Select a slide layout</td>
<td>Ctrl + Shift + F</td>
<td>Change Font Style</td>
</tr>
<tr>
<td>Alt + N, P</td>
<td>Insert a picture</td>
<td>Shift + F3</td>
<td>Toggle cases</td>
</tr>
<tr>
<td>Alt + H</td>
<td>Home Tab</td>
<td>Ctrl + Shift + Z</td>
<td>Normal/Plain Text</td>
</tr>
<tr>
<td>Alt + N</td>
<td>Insert Tab</td>
<td>Shift + F6</td>
<td>Move anticlockwise among pane</td>
</tr>
<tr>
<td>Alt + S, B</td>
<td>Start Slideshow</td>
<td>Shift + F10</td>
<td>Display context menu</td>
</tr>
<tr>
<td>Alt + F, X</td>
<td>Close PowerPoint</td>
<td>Ctrl + F5</td>
<td>Restore window to previous size</td>
</tr>
<tr>
<td>Esc</td>
<td>End the PowerPoint</td>
<td>Alt + F5</td>
<td>Search</td>
</tr>
<tr>
<td>Alt + T</td>
<td>Transitions Tab</td>
<td>Alt + R</td>
<td>Review Tab</td>
</tr>
<tr>
<td>Alt + A</td>
<td>Animations Tab</td>
<td>Alt + G</td>
<td>Design Tab</td>
</tr>
<tr>
<td>F5</td>
<td>Slide Show</td>
<td>Alt + W</td>
<td>View Tab</td>
</tr>
</tbody>
</table>

1. Which of the following menu types is also called a drop-down menu? (RBI Asst. Mains)
   (1) Fly-down  (2) Pop-down  (3) Pull-down
   (4) Drag-down (5) Push-down
2. Which of the following shortcut keys is used to ‘Find and Replace’ text in a word document? (RRB Assistant)

(1) CTRL + G  
(2) CTRL + H  
(3) CTRL + I  
(4) CTRL + F  
(5) CTRL + K

3. Which of the following is NOT true about hyperlink in MS Word? (NABARD)

(1) Hyperlinks can only be used to create a link for an existing webpage and not to an existing file on your computer.  
(2) It can be made using the INSERT Tab in a Word Document.  
(3) The shortcut command to create a hyperlink in a word document is CTRL + K.  
(4) The option ‘Place in This Document’ is used to refer to a link in the current document.  
(5) Apart from hyperlinks in text, one can also create links in images.

4. Which of the following is the shortcut key for paste? (RRB PO)

(1) Ctrl + V  
(2) Ctrl + A  
(3) Ctrl + C  
(4) Ctrl + P  
(5) Ctrl + K

5. Setting fonts for the text in your document is an example of _____.(RBI Asst. Mains)

(1) Reviewing  
(2) Designing  
(3) Inserting  
(4) Formatting  
(5) Viewing

6. Copy and X Copy are same in the sense __________. (RBI Asst. Mains)

(1) Both can be used to copy file or group of files  
(2) Both are external commands of windows  
(3) Both are internal command of DOS  
(4) Both are commands of Apple OS  
(5) Both external command of DOS

7. Which of the following are valid minimum & maximum zoom sizes in MS word? (RBI Asst. Mains)

(1) 20, 600  
(2) 30, 300  
(3) 100, 400  
(4) 10, 500  
(5) 50, 800

8. Which of the following is displayed by MS Excel when the column is not big enough to display the information? (NABARD)

(1) $$$  
(2) ####  
(3) &&&&  
(4) ****  
(5) >>>>>

**Answer keys**

1. (3)  
2. (2)  
3. (1)  
4. (1)  
5. (4)  
6. (1)  
7. (4)  
8. (2)

**Solutions**

1. Also called as Pull-down menu, drop-down is a menu of commands or options that appears when you select an item with a mouse. The item you select is generally at the top of the display screen, and the menu appears just below it, as if you had pulled it down.

2. If you want to find and replace text in a Word document, use the key combo Ctrl + H. That will bring up the “Find and Replace” dialog box. Then simply type in the word or words you are looking for and what to replace it with. Then click the “Replace All” button.
3. Hyperlinks can be used to create links for existing webpages as well as files on one’s computer, to email addresses and to specific locations to a document.

4. Ctrl + V is used to Paste all that we have copied. It could be text, file, image or folder. A very useful feature to bring everything together. If we would like to paste plain simple text, without original formatting just add Shift to it. i.e. Ctrl + Shift + V.

5. Formatting text in Microsoft Word involves tasks like bolding the text, italicising it, and changing the font and size. The commands to perform all of these formatting tasks are found on the Home tab in the Font group. Alternatively, we can use the keyboard shortcuts for those commands. Bold: CTRL+ B, Italic: CTRL + I, Underline: CTRL + U

6. Copy and X Copy can be used to copy file or group of files. By using COPY keyword, we can copy the files and folder from source to destination easily. X Copy command is an advanced version of the copy command. It is used for moving files, directories, and even entire drives from one location to another.

7. It is in the settings menu where there is the maximum and minimum zoom level. We cannot really shut it off but can minimize and maximize the resolution of your browser it uses. minimum & maximum zoom sizes in MS word are 10 & 500%.

8. Excel spreadsheets display a series of number or pound signs like ##### in a cell when the column is not big enough to display the information. It also happens if you have a cell formatted to display something different than what you need the spreadsheet to show.

**File Extension**

A file extension is a suffix at the end of a filename that specifies what type of file it is. It helps the operating system to understand the characteristics of the file.

*Example – filename.docx is the name of the document. ‘.docx’ is the file extension.*

### List of File Extension

<table>
<thead>
<tr>
<th>File Extension</th>
<th>Meaning</th>
<th>File Extension</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>.apk</td>
<td>Android Package file</td>
<td>.bin</td>
<td>Binary file</td>
</tr>
<tr>
<td>.txt</td>
<td>Plain text file</td>
<td>.py</td>
<td>Python file</td>
</tr>
<tr>
<td>.ods</td>
<td>OpenOffice Calc spreadsheet file</td>
<td>.exe</td>
<td>Executable file</td>
</tr>
<tr>
<td>.xlr</td>
<td>Microsoft Works spreadsheet file</td>
<td>.com</td>
<td>MS-DOS command file</td>
</tr>
<tr>
<td>.xls</td>
<td>Microsoft Excel File</td>
<td>.mp3</td>
<td>MP3 audio file</td>
</tr>
<tr>
<td>.xlsx</td>
<td>MS Excel Open XML spreadsheet file</td>
<td>.wma</td>
<td>Windows media audio file</td>
</tr>
<tr>
<td>.pptx</td>
<td>PowerPoint Open XML presentation</td>
<td>.wpl</td>
<td>Windows Media Player Playlist</td>
</tr>
<tr>
<td>.ppt</td>
<td>PowerPoint presentation</td>
<td>.mpg/.mpeg</td>
<td>MPEG Video file</td>
</tr>
<tr>
<td>.db/.dbf</td>
<td>Database file</td>
<td>.avi</td>
<td>Audio Video Interleave file</td>
</tr>
<tr>
<td>.sql</td>
<td>SQL Database file</td>
<td>.flv</td>
<td>Adobe Flash video file</td>
</tr>
<tr>
<td>.tar</td>
<td>Linux / Unix tarball file archive</td>
<td>.mp4</td>
<td>MPEG-4 video file</td>
</tr>
<tr>
<td>.bak</td>
<td>Backup file</td>
<td>.odt</td>
<td>Open office writer doc file</td>
</tr>
<tr>
<td>.tmp</td>
<td>Temporary file</td>
<td>.pdf</td>
<td>PDF file</td>
</tr>
<tr>
<td>.htm/.html</td>
<td>HTML/Hypertext Markup Language file</td>
<td>.js</td>
<td>JavaScript file</td>
</tr>
</tbody>
</table>
A computer network or data network is a telecommunications network which allows computers to exchange data using a data link. The connections between nodes (computers on networks called nodes) are established using either cable media or wireless media. Vint Cerf and Bob Kahn are known as fathers of the Internet.

The five components of a computer network are:

- **Sender (Device)**
- **Sender Equipment (Encoder)**
- **Communication Channel (Cables, Wireless)**
- **Receiver Equipment (Decoder)**
- **Receiver (Device)**

**Sender** - Sender is a device that sends a message which can consist of text, numbers, pictures etc. It is also called source or transmitter.

**Sender Equipment** - The encoder is a device that converts digital signals in a form that can pass through a transmission medium.

**Communication Channel** - It is the physical path that connects the sender and the receiver. It is used to transmit data. It is also called Medium. The channel can be a copper wire, a fiber optic cable, microwaves etc

**Receiving Equipment** - The decoder is a device that converts the encoded signals into digital form. The receiver can understand the digital form of message.

**Receiver** - Receiver is a device that receives the message. It is also called a sink. It must be capable of accepting the message.

**Types of Computer Network**

The Network allows computers to connect and share resources with other devices through a medium. Based on the area coverage, there are three types of computer networks.

- **LAN** – Local Area Network
- **MAN** – Metropolitan Area Network
- **WAN** – Wide Area Network

**Local Area Network**

LAN is a computer network covering a small geographical area and is privately owned. The Communication medium used for LAN has twisted pair cables and coaxial cables. LAN offers high-speed communications data rates up to 1000 Mbps. The fault tolerance of a LAN is more, and congestion is less in this network. LAN can be used for an office building, home, hospital, schools, etc.

**Metropolitan Area Network**

MAN covers a large geographical area than LAN. It is designed for customers who need a high-speed connectivity and it is usually owned by large organizations to interconnect its various branches across a city. The fault tolerance of a MAN is less and congestion in the network is more. Modem and Wire/Cable are used as transmission devices. It may serve as an Internet Service Provider (ISP).

**Wide Area Network**

WAN covers the large geographical area and it might be restricted within the bounds of a state or country. It could be a connection of LAN connecting to other LAN through telephone lines and radio waves. The technology is high speed and relatively expensive.

The Speed of WAN ranges from few kilobits per second (Kbps) to megabits per second (Mbps). Public packet networks, Large corporate networks, Military networks, Banking networks, Stock brokerage networks, and Airline reservation networks are constructed by WAN.
Other types

**Wireless Local Area Network (WLAN)** - WLAN is a wireless network communication over short distances. This distribution method uses high-frequency radio waves and often include an access point to the Internet. It is also called Local Area Wireless Network (LAWN).

*Example* - A mobile user can connect to LAN via wireless connection.

**Storage Area Network (SAN)** - SAN is a high-speed special-purpose network. It supports data storage, retrieval, and sharing of data, multiple disk arrays, data migration from one storage device to another and uses Fibre Channel interconnection technology.

**Campus Area Network (CAN)** - CAN is a computer network of interconnected local area networks. It is larger than a LAN but smaller than MAN or WAN. It can also stand for Corporate Area Network.

*Example* - Massachusetts Institute of Technology’s (MIT) Project Athena has CAN network.

**Personal Area Network (PAN)** - PAN refers to the interconnection of telecommunications devices or gadgets such as a laptop, mobile phones, printers etc around an individual person. It can cover a network range of 30 feet (approximately 10 m). It can be constructed by using cables or it may be wireless.

**Wireless Personal Network (WPAN)** – WPAN is a type of personal area network. It uses wireless communication to transfer data between the connected devices of the user. It is also known as short wireless distance network.

### Network Architecture

It is the physical and logical design which denotes to the software, hardware, protocols and the media of transmission of data. Peer-to-Peer (P2P) and Client/Server or tiered are the two types of widely used network architecture.

**Peer-to-Peer Architecture** - Tasks are allocated to all the devices of the network. There is no hierarchy among the computers and all of them are considered equal. All computer can able to use resources available on this network. This is also known as a distributed architecture. It doesn’t use a server that controls network activity. Peer-to-peer is mostly used for file sharing.

**Client/Server Architecture** – The server acts as a hub in which other computers (clients) are connected. The server manages and provides resources to any client that requests them.

### Other Terms used in networks

**Protocol** - Protocol is a set of guidelines for exchanging data over a computer network, such as local area network, Internet, Intranet, etc.

**Ethernet** - Ethernet is the most widely used LAN technology that defines wiring and signalling standards for the physical layer of TCP/IP. Ethernet was standardized as IEEE 802.3.

**Token Ring** - It is a local area network topology where nodes are arranged in a ring topology. The data passes between nodes on the network until it returns to the source station. A token ring topology uses a token to ensure that only one node on the line is used at a time to prevent congestion and collision. The token ring LAN system was standardized as IEEE 802.5.

**Fiber distributed data interface (FDDI)** - FDDI is an optical data communication standard used for long distance networks provides communication with fiber optic lines. This protocol is based on the token ring protocol.

### Network Topology

A network topology is the arrangement of a network, nodes and connecting lines. The physical topology and the logical (or signal) topology are the types of network topology.

**Physical Topology**

The physical topology refers to the geometric layout of the connected network. Bus Topology, Ring Topology, Tree Topology, Mesh Topology, Star Topology, and Hybrid Topology are several forms of Physical Topology.
Bus Topology

In the Bus topology system, every computer and network are connected by using a single cable. The cable is known as Bus. It transmits the data from one end to another end only in a single direction. When it has exactly two endpoints, then it is called Linear Bus topology. A network that uses a bus topology is referred to as a bus network. Bus networks were the original form of an Ethernet network.

Ring Topology

In ring Topology, network nodes are connected in a closed loop configuration. Each node has directly connected with its adjacent node on both sides. The Others are indirectly connected and the data passing through one or more intermediate nodes.

- **Dual Ring Topology** - When the transmission is bidirectional by having two connections between each network node, it is called Dual Ring Topology. It is a network redundant topology where nodes are connected using two concentric rings with four branches. If one ring fails, the second ring can act as a backup, to keep the network up.
Tree Topology

In Tree Topology network, two or more-star networks connected with a root node and all other nodes are connected to it forming a hierarchy. It is also called hierarchical topology. It should at least have three levels to the hierarchy. This type of topology used in Wide Area Network. Tree topology is valued for its scalability and accessibility for troubleshooting.

Star Topology

In a star topology, all the nodes are connected to a single hub through a cable. This hub is the central node. The data can send from one node to another through the hub. Hub acts as a repeater for data flow. It can be used with twisted pair, Optical Fibre or coaxial cable.
Mesh Topology

In Mesh Topology, every node carries traffic only between the two nodes it connects (point-to-point connection). Mesh has \( n(n-1)/2 \) physical channels to link \( n \) devices.

**Example** - Each telephone regional office needs to be connected to every other regional office.

There are two techniques to transmit data over the Mesh topology. They are Routing, Flooding.

- **Routing** – The nodes have a routing logic to direct the data to reach the designation using the shortest distance.
- **Flooding** – The data is transmitted to all the nodes in the network, hence no routing is required.

**Types of Mesh Topology**

- **Partial Mesh Topology** - In this topology, some of the nodes are connected to all nodes and some nodes are connected only to some nodes.
- **Full Mesh Topology** - Every node is connected to each other.
- **Hybrid Topology**

It is a group of two or more topologies. It is a scalable topology and it can be expanded easily. It is reliable.
Logical/Signal Topology

Logical Topology denotes how the signals transmitted from node to node across the system. Broadcast and Token Passing are the two types of Logical topology.

✓ **In Broadcast**, there is no need for instructions. Ethernet is working in Broadcast transmission.
✓ **In Token Passing**, electronic token is passed to each node. When a token is received by the node, the node can send data on the network. Token Ring and Fibre Distributed Data Interface (FDDI) are using Token Passing. Arc net is token passing on a bus topology.

1. Bluetooth is an example of which of the following Networks? (NABARD)
   (1) MAN
   (2) PAN
   (3) WPAN
   (4) Both (1) & (2)
   (5) Both (1) & (3)

2. Each telephone regional office needs to be connected to every other regional office. This is an example of which of the following topology? (RRB PO)
   (1) Bus Topology
   (2) Tree Topology
   (3) Star Topology
   (4) Ring Topology
   (5) Mesh Topology

**Answer keys**

1. (2) 2. (5)

**Solutions**

1. A Personal Area Network or PAN is a computer Network that enables communication between computer devices near a person. PANs can be wired, such as USB or FireWire or they can be wireless such as Infrared, ZigBee, Bluetooth and Ultrawideband or UWB. The range of a PAN typically is a few metres.

Examples of Wireless PAN or WPAN devices include cell phones, wireless keyboards, wireless mice, printers, bar code scanners and game consoles.

2. In Mesh Topology, every node has carries traffic only between the two nodes it connects (point-to-point connection). Mesh has n(n-1)/2 physical channels to link n devices.

There are two techniques to transmit data over the Mesh topology. They are Routing, Flooding. Example of Mesh Topology - Each telephone regional office needs to be connected to every other regional office.

**Open System Interconnection Model (OSI Model)**

The Open Systems Interconnection (OSI) Model is an intangible and logical arrangement that describes network communication between two systems by using different layer protocols. The OSI model developed by the International Standards Organization (ISO). It has seven layers to transmit data from one to another.

**Layers in The OSI Model**

**Physical Layer (Layer 1)**

It is the lowest layer in the OSI model. It deals with the bit-level transmission between the devices. It supports mechanical and electrical specifications of the interface and transmission medium. Hub, Repeater, Modem, Cables are Physical Layer devices. The data unit of this layer is Bit. It converts the signal into 0s and 1s and sends them to the next layer. Simplex, half-duplex and full-duplex are the transmission modes for this layer.

**Protocols used** - ATM, RS232, and Ethernet.

**Data Link Layer**

It is used for the encoding, decoding and logical organization of data bits. It makes the physical layer appear error-free. It converts the bits into the frames depending on the frame size of Network Interface Card (NIC). Switch and Bridge is Data Link Layer devices. HDLC, LSL, and ATM are the implemented protocols on this layer. It has two sub-layers.
➢ Media Access Control (MAC) – It is responsible to the physical address of the sender and/or receiver in the header of each frame. CSMA/CD, Ethernet are used as protocol.

➢ Logical Link Control (LLC) – It is responsible for frame management, error checking, and flow control of data.

Network Layer
This network provides the shortest path for transmitting data for network communication to avoid congestion. Data is transmitted in the form of packets through the logical network path. The IP address of the sender/receiver is placed in the header. Routers are used as networking devices. The IPX and TCP/IP are the implemented protocols on this layer. Routing and Logical Addressing are the functions of this layer.

✓ Routing – Finding the shortest path for data transmission.
✓ Logical Addressing – Placing the IP address of the sender/receiver in the header.

Physical Layer, Data Link Layer, and Network Layer are also known as Hardware Layer.

Transport Layer
This layer is called as Heart of OSI model. It is responsible for end-to-end network communication, flow control of data, error recovery and reliability and quality of data. The data in the transport layer is referred to as Segments. It is operated by the Operating System. SPX, TCP/IP’s, DNS are examples of implemented protocols on this layer.

Session Layer
This layer is responsible for the establishment of the connection, maintenance of sessions, synchronization and ensures security. It allows adding checkpoints (synchronization points) into the data to identify the error. This layer is the network dialog controller which allows two systems into the dialog in either half duplex or full duplex mode. RPC, PPTP, SCP, SDP are some protocols of this layer.

Presentation Layer
This layer performs encryption and decryption of data. It gives the data in a readable format from an application layer perspective. It reduces the number of bits that need to be transmitted on the network. It offers liberty from compatibility troubles. It is called the Translation layer and Syntax layer.

Example - ASCII code to EBCDIC coded text file.

Application Layer
This layer focuses on process-to-process communication across an IP network and provides a firm communication interface and end-user services. It supports services such as electronic mail, remote file access, and transfer, shared database management, Web chat and surfing, Directory services and Network Virtual Terminal. HTTP, FTP, Telnet, SMTP, and DNS have used protocols of this layer. It is also called as Desktop Layer.

Session Layer, Presentation Layer, and Application layer are also known as Upper Layers or Software Layers.

TCP/IP Model
TCP model is a tangible, client-server model. It is one of the most used protocols in digital network communications. It has only four layers in a data communication network.

Host-to-Network Layer – In this layer, the host has connected to the network using the protocol to send IP packets. Ethernet, Token Ring, FDDI, X.25, Frame Relay are used.

Internet Layer – It transfers the Internet Protocol packets (IP datagrams) to the destination. IP, ICMP, ARP, RARP, and IGMP have used protocols.
Transport Layer – It is like as transport layer in the OSI model. Two end-to-end transport protocols are used. Transmission Control Protocol (TCP) and Use Datagram Protocol (UDP).

Application Layer – It contains high-level protocols. TELNET, FTP, SMTP, DNS, HTTP, NNTP, DHCP are used.

**Data Transmission Modes**

Data Transmission modes refer to the way of transferring the information or data between two connected devices. Three types of transmission modes are:

- **Simplex Mode**
- **Half Duplex Mode**
- **Full Duplex Mode**

**Simplex Mode** – In this type, the data can be transferred in only one direction. The only one can transmit and the other can receive the data.

Example – Keyboard (Input) and Monitor (output), Loud Speaker, Television, Fire alarm system etc.

**Half Duplex Mode** – In this type, the data can be transferred in both directions, but not at the same time. Example – Walkie-talkie

**Full Duplex Mode** – In this type, the data can be transferred in both direction on the same transmission path. Two lines are used for sending and receiving the data.

Example – Telephone network

**Data Transmission Media**

Data or information is transferred to one place from another through the physical/wireless media which is known as Transmission Media. Guided Media and Unguided Media are two types of Transmission Media.

**Guided Media/Bounded Media**

The signals are transmitted through the narrow path which made by physical links. Twisted Pair cable, Coaxial Cable and Fibre-Optic Cable are the types of Bounded Media. Twisted-pair and coaxial cable accept signals in the form of electric current. Optical fibre accepts signals in the form of light.

**Unguided/Unbounded Media**

The signals are transmitted without using any cables. This type of transmission is known as wireless communication. Radio waves, Infrared, Micro waves are some popular type of unbound transmission media.

- **Microwave** – Mobile phone, Satellite networks, Wireless LANs.
- **Radio Wave** – Radio, Television and Paging system
- **Infrared** – Short range communication (TV remote control, IRD port etc)

**Network Devices**

**Hub** - Hub is a networking device which connects multiple network hosts. It is used to transfer data. The hub sends data packets (frames) to all devices on a network. Active Hub (Repeaters) and Passive Hub are two categories of Hub.

**Switch** - Switch is a small hardware device that works at the layer of LAN (Local Area Network). It receives incoming data packets, filters the packet and sends only to the interface of the intended receiver. It maintains a CAM (Content Addressable Memory) table and has own system configuration and memory. CAM table is also known as forwarding table or forwarding information base (FIB).

**Modem (Modulator-Demodulator)** - It is a hardware component that allows a computer to connect to the Internet. It converts analog signal to digital signal.

**Router** – It is a hardware device which is responsible for routing traffic from one to another network. It is designed to receive, convert and move packets to another network.

**Bridge** – Bridge is a network device that connects a local area network to another local area network that uses the same protocol.

**Gateway** - A gateway is a network node that connects two dissimilar networks using different protocols together.

**Repeater** – It is an electronic device that magnifies the signal it receives. It is implemented in computer networks to expand the coverage area of the network. It is also known as signal boosters.

**Firewall** - A firewall is a network security system that monitors and controls overall incoming and outgoing network traffic based on advanced and a defined set of security rules.
Internet

It is the global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols (TCP/IP).

ARPANET was the world's first fully operational packet switching computer network, developed by the Advanced Research Projects Agency of the U.S. Department of Defense in 1969. It connected with only four computers. ARPANET adopted TCP/IP in 1983 and the “network of networks” became the modern Internet.

World Wide Web - WWW is one of the services interconnected over the internet. It is a collection of all information, resources, pictures, sounds, multimedia on the internet which is formatted in HTML and accessed through HTTP.

Web Server – A web server stores, processes and delivers web pages to the users. The intercommunication between users and servers is done using Hypertext Transfer Protocol (HTTP).

Web Page – It is a document was written in HTML that can be accessed through the internet by using the web browser. It is identified by Uniform Resource Locator.

Web Browser - It is a software application that allows users to access the websites. Internet Explorer, Google Chrome, Opera, Mozilla Firefox, UC Browser, Apple Safari are some examples of a web browser.

Home Page – Homepage is the default page of the website.

Hypertext Mark-up Language (HTML) – HTML is used to create web pages that are displayed on the Internet.

Hypertext Transfer Protocol (HTTP) - This protocol is used to transfer data over the web. It runs on top of the TCP/IP set of protocols. It uses a server-client model.

Transmission Control Protocol/Internet Protocol (TCP/IP) – It is a set of communication protocols which is used to access the internet. TCP/IP was developed by Bob Kahn and Vint Cerf in 1978.

Internet Host – Host is a computer or application which is used to transfer the data on the internet. Each host has a unique IP address called Hostname.

Internet Protocol Address (IP Address) – It is a logical numeric address that is used to identify the host over the internet network.

✓ The stable version of IP – IPv4 (32 bits). It is written in decimal and separated by periods.

✓ Latest Version of IP – IPv6 (128 bits). It is written in Hexadecimal and separated by colons.

Uniform Resource Locator (URL) - A uniform resource locator (URL) is used to locate the address of a resource and protocol.

Domain Name - A domain name serves as an address which is used to access the website. It can be universally understood by Web servers and online organizations.

Top Level Domains are following.

<table>
<thead>
<tr>
<th>Domain Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.com</td>
<td>Commercial</td>
</tr>
<tr>
<td>.net</td>
<td>Network-oriented</td>
</tr>
<tr>
<td>.org</td>
<td>Non-Profit Organization</td>
</tr>
<tr>
<td>.edu</td>
<td>Education</td>
</tr>
<tr>
<td>.gov</td>
<td>Government</td>
</tr>
<tr>
<td>.mil</td>
<td>Military</td>
</tr>
<tr>
<td>.int</td>
<td>International Treaties</td>
</tr>
</tbody>
</table>

Domain Name System (DNS) – DNS translates domain names into IP addresses. It has a large database of domain names and its IP addresses.

Uploading – It refers to the transmission of data or files from the computer to the internet server. Uploaded file can be retrieved by anyone.

Downloading – It is the process of copying files from the internet to the user's computer.

Email - Electronic mail is the transmission of messages over the internet. In an email, the user can attach documents, pictures, videos etc.

Carbon copy (CC) – It is used to share e-mail with one or more recipients. Both the main recipients and other (CC) recipients can see all the mail addresses.
Blind Carbon Copy (BCC) – In this, the recipients of the message and other recipients (BCC) cannot see the persons who all receive the e-mail.

1. Which of the following is NOT an Internet Browser? (RRB Assistant)
   (1) Safari  (2) Opera  (3) Chromium  (4) Ruby  (5) Brave

2. The Internet is a system of ______.(RBI Asst. Mains)
   (1) Computer Networks  (2) Data Buses  (3) Servers  (4) WAN wires  (5) None of these

3. What is Window Explorer? (RBI Asst. Mains)
   (1) Web Browser  (2) File Manager  (3) OOPS Program  (4) Operating System  (5) Computer Instruction

**Answer keys**

1. (4)  2. (1)  3. (2)

**Solutions**

1. Alternatively referred to as a web browser or Internet browser, a browser is a software program to present and explore content on the World Wide Web. These pieces of content, including pictures, videos, and web pages, are connected using hyperlinks and classified with URIs (Uniform Resource Identifiers). Ruby is an interpreted, high-level, general-purpose programming language. It was designed and developed in the mid-1990s by Yukihiro "Matz" Matsumoto in Japan.

2. The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer. It was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the ARPAnet. The original aim was to create a network that would allow users of a research computer at one university to "talk to" research computers at other universities.

3. Windows Explorer is the file manager used by Windows 95 and later versions. It allows users to manage files, folders and network connections, as well as search for files and related components. Windows Explorer has also grown to support new features unrelated to file management such as playing audio and videos and launching programs, etc. The desktop and the taskbar also form part of Windows Explorer.
Computer Hacking

Hacking is an attempt to exploit a computer system or a private network inside a computer. It is the unauthorized access to or control over computer network security systems for some illicit purpose. Viruses, Keyloggers, Rootkit, Spoofing attack, Packet Sniffer, Trojan horse, Password cracking are various of techniques for hacking.

Computer Virus - A computer virus is a malicious software program loaded onto a user's computer without the user's knowledge and performs malicious actions. Stuxnet, Petya, Wanna cry, Code red, Melissa, Sasser, Zeus, Mydoom, Crypto Locker, Flashback are some example of Viruses.

The Elk Cloner virus was the first self-replicating computer program to spread on a large scale. It was created by a 15-year-old Rich Skrenta in 1982. Ryuk, Troldesh are ransomware family of newly discovered viruses.

Computer Worm - A computer worm is a malicious, self-replicating software program (malware) which affects the functions of software and hardware programs. Stuxnet is the most famous computer worm.

Ransomware - Ransomware is a type of malware program that infects and takes control of a system. It infects a computer with the intention of extorting money from its owner.

Botnet – Botnet is a set of networks connected computers/devices that are used for malicious purposes. Each computer in a botnet is called Bot. It is also known as Zombie.

Trojan horse – It is a type of malware that presents itself as legitimate software. It may perform actions on a computer that is genuine but will install malware actions.

Keylogger - A keylogger is a type of malware that stores all keystrokes of a computer. It can record all sorts of personal information, such as usernames, passwords, credit card numbers, and personal documents such as emails and reports.

Rootkit - A rootkit is a secret computer program designed to provide continued access to a computer while actively hiding its presence. Rootkits are associated with malware such as Trojans, worms, viruses.

Spyware - Spyware is a software that is installed on a computing device without the end user's knowledge. It steals internet usage data and sensitive information such as usernames and passwords, activating the microphone or camera on a computer to record physical activity.

Adware - Adware is unwanted software designed to display advertisements on the computer screen to generate income. This type of ads cannot be removed easily.

Phishing – Phishing is a cyber-attack that used to steal user data, including login credentials and credit card numbers. They use email as a weapon and trick the email recipient into believing that the message is received from real companies such as banks, Amazon etc to harvest the recipient's details. Email Phishing, Spear Phishing (targets special person/organization) are techniques of Phishing.

Smurfing - It is a type of denial-of-service attack that relies on flooding a network with a large volume of traffic through the manipulation of IP addresses in that network. This type of attack can result in a high volume of excess activity, which can overwhelm a server or IT setup.

1. _______ is a type of denial-of-service attack that relies on flooding a network with a large volume of traffic through the manipulation of IP addresses in that network. (RRB PO)

(1) Phishing (2) Hacking (3) Smurfing
(4) Churning (5) Twisting

Answer key

1. (3)

Solution

1. In an IT context, smurfing is a type of denial-of-service attack that relies on flooding a network with a large volume of traffic through the manipulation of IP addresses in that network. This type of attack can result in a high volume of excess activity, which can overwhelm a server or IT setup.
## List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>American Standard Code For Information Interchange</td>
</tr>
<tr>
<td>ALU</td>
<td>Arithmetic Logic Unit</td>
</tr>
<tr>
<td>ALGOL</td>
<td>Algorithmic Language</td>
</tr>
<tr>
<td>ARP</td>
<td>Address Resolution Protocol</td>
</tr>
<tr>
<td>API</td>
<td>Application Program Interface</td>
</tr>
<tr>
<td>ATM</td>
<td>Asynchronous Transfer Mode</td>
</tr>
<tr>
<td>AI</td>
<td>Artificial intelligence</td>
</tr>
<tr>
<td>BASIC</td>
<td>Beginner’s All-purpose Symbolic Instruction Code</td>
</tr>
<tr>
<td>BIOS</td>
<td>Basic Input Output System</td>
</tr>
<tr>
<td>Bit</td>
<td>Binary Digit</td>
</tr>
<tr>
<td>BCC</td>
<td>Blind Carbon Copy</td>
</tr>
<tr>
<td>BIU</td>
<td>Bus Interface Unit</td>
</tr>
<tr>
<td>BIS</td>
<td>Business Information System</td>
</tr>
<tr>
<td>BPS</td>
<td>Bits Per Second</td>
</tr>
<tr>
<td>BCR</td>
<td>Bar Code Reader</td>
</tr>
<tr>
<td>BIPS</td>
<td>Billion Instruction Per Second</td>
</tr>
<tr>
<td>BRD</td>
<td>Blu-Ray Disc</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
</tr>
<tr>
<td>CADD</td>
<td>Computer Aided Design and Drafting</td>
</tr>
<tr>
<td>CAN</td>
<td>Campus Area Network</td>
</tr>
<tr>
<td>CC</td>
<td>Carbon Copy</td>
</tr>
<tr>
<td>CD</td>
<td>Compact Disk</td>
</tr>
<tr>
<td>CDROM</td>
<td>Compact Disk Read Only Memory</td>
</tr>
<tr>
<td>CD - R</td>
<td>Compact Disk - Recordable</td>
</tr>
<tr>
<td>CD – RW</td>
<td>Compact Disk Rewritable</td>
</tr>
<tr>
<td>CD – WO</td>
<td>Compact Disk - Write Once</td>
</tr>
<tr>
<td>COBOL</td>
<td>Common Business Oriented Language</td>
</tr>
<tr>
<td>CPI</td>
<td>Clock / Cycle Per Instruction</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>CRT</td>
<td>Cathode Ray Tube</td>
</tr>
<tr>
<td>CASE</td>
<td>Computer-Aided Software Engineering</td>
</tr>
<tr>
<td>CPS</td>
<td>Characters Per Second.</td>
</tr>
<tr>
<td>CROM</td>
<td>Control Read-Only Memory</td>
</tr>
<tr>
<td>DVD</td>
<td>Digital Versatile Disk</td>
</tr>
<tr>
<td>DVI</td>
<td>Digital Visual Interface</td>
</tr>
<tr>
<td>DVDR</td>
<td>Digital Versatile Disk Recordable</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>DVDRW</td>
<td>Digital Versatile Disk Rewritable</td>
</tr>
<tr>
<td>DRAM</td>
<td>Dynamic Random-Access Memory</td>
</tr>
<tr>
<td>DBMS</td>
<td>Data Base Management System</td>
</tr>
<tr>
<td>DNS</td>
<td>Domain Name System</td>
</tr>
<tr>
<td>DHTML</td>
<td>Dynamics Hyper Text Mark-up Language</td>
</tr>
<tr>
<td>DPI</td>
<td>Dots Per Inch</td>
</tr>
<tr>
<td>DVR</td>
<td>Digital Video Recorder</td>
</tr>
<tr>
<td>DOS</td>
<td>Disk Operating System</td>
</tr>
<tr>
<td>DTP</td>
<td>Desk-Top Publishing</td>
</tr>
<tr>
<td>EDP</td>
<td>Electronic Data Processing</td>
</tr>
<tr>
<td>EDSAC</td>
<td>Electronic Delay Storage Automatic Calculator</td>
</tr>
<tr>
<td>EEPROM</td>
<td>Electronically Erasable Programmable Read Only Memory</td>
</tr>
<tr>
<td>EFS</td>
<td>Encrypted File System</td>
</tr>
<tr>
<td>ENIAC</td>
<td>Electronics Numerical Integrator And Calculator</td>
</tr>
<tr>
<td>EPROM</td>
<td>Erasable Programmable Read Only Memory</td>
</tr>
<tr>
<td>EROM</td>
<td>Erasable Read Only Memory</td>
</tr>
<tr>
<td>ESDI</td>
<td>Enhanced Small Device Interface</td>
</tr>
<tr>
<td>FORTRAN</td>
<td>Formula Translation</td>
</tr>
<tr>
<td>FTP</td>
<td>File Transfer Protocol</td>
</tr>
<tr>
<td>FDD</td>
<td>Floppy Disk Drive</td>
</tr>
<tr>
<td>FDC</td>
<td>Floppy Disk Controller</td>
</tr>
<tr>
<td>FPS</td>
<td>Frames Per Second</td>
</tr>
<tr>
<td>FLOPS</td>
<td>Floating Point Operations Per Second</td>
</tr>
<tr>
<td>FAT</td>
<td>File Allocation Table</td>
</tr>
<tr>
<td>FAX</td>
<td>Far Away Xerox/ facsimile</td>
</tr>
<tr>
<td>GDI</td>
<td>Graphical Device Interface</td>
</tr>
<tr>
<td>GIF</td>
<td>Graphic Interchangeable Format</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GML</td>
<td>Geography Mark-up Language</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile Communication</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hyper Text Transfer Protocol</td>
</tr>
<tr>
<td>HTTPS</td>
<td>Hyper Text Transfer Protocol Secure</td>
</tr>
<tr>
<td>HTML</td>
<td>Hyper Text Mark-up Language</td>
</tr>
<tr>
<td>HVD</td>
<td>Holographic Versatile Disc</td>
</tr>
<tr>
<td>HD</td>
<td>Hard Disk</td>
</tr>
<tr>
<td>HDD</td>
<td>Hard Disk Drive</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>ISP</td>
<td>Internet Service Provider</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IOP</td>
<td>Input Output Processor</td>
</tr>
<tr>
<td>IBM</td>
<td>International Business Machines</td>
</tr>
<tr>
<td>IC</td>
<td>Integrated Circuit</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IMAP</td>
<td>Internet Message Access Protocol</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organisation</td>
</tr>
<tr>
<td>INTEL</td>
<td>Integrated Electronics</td>
</tr>
<tr>
<td>IVR</td>
<td>Interactive Voice Response</td>
</tr>
<tr>
<td>JAR</td>
<td>Java ARchive</td>
</tr>
<tr>
<td>JPEG</td>
<td>Joint Photographic Expert Group</td>
</tr>
<tr>
<td>JSP</td>
<td>Java Server Page</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>LPI</td>
<td>Lines Per Inch</td>
</tr>
<tr>
<td>LSI</td>
<td>Large Scale Integration</td>
</tr>
<tr>
<td>MAN</td>
<td>Metropolitan Area Network</td>
</tr>
<tr>
<td>MIPS</td>
<td>Million Instructions Per Second</td>
</tr>
<tr>
<td>MICR</td>
<td>Magnetic Ink Character Recognition</td>
</tr>
<tr>
<td>MPEG</td>
<td>Motion Picture Experts Group</td>
</tr>
<tr>
<td>MMS</td>
<td>Multimedia Message Service</td>
</tr>
<tr>
<td>NAT</td>
<td>Network Address Translation</td>
</tr>
<tr>
<td>NIC</td>
<td>Network Interface Card</td>
</tr>
<tr>
<td>NTP</td>
<td>Network Time Protocol</td>
</tr>
<tr>
<td>OMR</td>
<td>Optical Mark Reader</td>
</tr>
<tr>
<td>OSI</td>
<td>Open Systems Interconnection</td>
</tr>
<tr>
<td>OSS</td>
<td>Open Source Software</td>
</tr>
<tr>
<td>OOP</td>
<td>Object Oriented Programming</td>
</tr>
<tr>
<td>OCR</td>
<td>Optical Character Recognition</td>
</tr>
<tr>
<td>PAN</td>
<td>Personal Area Network</td>
</tr>
<tr>
<td>PDA</td>
<td>Personal Digital Assistant</td>
</tr>
<tr>
<td>PDF</td>
<td>Portable Document Format</td>
</tr>
<tr>
<td>PHP</td>
<td>Hypertext Pre-processor</td>
</tr>
<tr>
<td>PNG</td>
<td>Portable Network Graphics</td>
</tr>
<tr>
<td>PPM</td>
<td>Pages Per Minute</td>
</tr>
<tr>
<td>PROM</td>
<td>Programmable Read Only Memory</td>
</tr>
</tbody>
</table>

www.oliveboard.in
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB</td>
<td>Printed Circuit Board</td>
</tr>
<tr>
<td>PIN</td>
<td>Personal Identification Number</td>
</tr>
<tr>
<td>POS</td>
<td>Point Of Sale</td>
</tr>
<tr>
<td>PPP</td>
<td>Point-to-Point Protocol</td>
</tr>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>POST</td>
<td>Power On Self Test</td>
</tr>
<tr>
<td>PING</td>
<td>Packet Internet Gopher</td>
</tr>
<tr>
<td>PSU</td>
<td>Power Supply Unit</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>ROM</td>
<td>Read Only Memory</td>
</tr>
<tr>
<td>RIP</td>
<td>Routing Information Protocol</td>
</tr>
<tr>
<td>RPM</td>
<td>Revolutions Per Minute</td>
</tr>
<tr>
<td>RDMS</td>
<td>Relational Data Base Management System</td>
</tr>
<tr>
<td>RARP</td>
<td>Reverse Address Resolution Protocol</td>
</tr>
<tr>
<td>SAN</td>
<td>Storage Area Network</td>
</tr>
<tr>
<td>SDRAM</td>
<td>Synchronous Dynamic Random Access Memory</td>
</tr>
<tr>
<td>SIM</td>
<td>Subscriber Identity Module</td>
</tr>
<tr>
<td>SIMM</td>
<td>Single In-line Memory Module</td>
</tr>
<tr>
<td>SIU</td>
<td>Serial Interface Unit</td>
</tr>
<tr>
<td>SMPS</td>
<td>Switch Mode Power Supply</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SMTP</td>
<td>Simple Mail Transfer Protocol</td>
</tr>
<tr>
<td>SNAP</td>
<td>Sub Network Access Protocol</td>
</tr>
<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
</tr>
<tr>
<td>SQL</td>
<td>Structured Query Language</td>
</tr>
<tr>
<td>SRAM</td>
<td>Static Random Access Memory</td>
</tr>
<tr>
<td>TCP</td>
<td>Transmission Control Protocol</td>
</tr>
<tr>
<td>TBPS</td>
<td>Tera Bytes Per Second</td>
</tr>
<tr>
<td>TIPS</td>
<td>Trillion Instruction Per Second</td>
</tr>
<tr>
<td>UNIAC</td>
<td>Universal Automatic Computer</td>
</tr>
<tr>
<td>UPS</td>
<td>Uninterruptible Power Supply</td>
</tr>
<tr>
<td>URL</td>
<td>Uniform Resource Locator</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
<tr>
<td>ULSI</td>
<td>Ultra Large-Scale Integration</td>
</tr>
<tr>
<td>VAN</td>
<td>Value Added Network</td>
</tr>
<tr>
<td>VGA</td>
<td>Video Graphics Array</td>
</tr>
<tr>
<td>VDU</td>
<td>Visual Display Unit</td>
</tr>
<tr>
<td>VIRUS</td>
<td>Vital Information Resource Under Seized</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>VCD</td>
<td>Video Compact Disk</td>
</tr>
<tr>
<td>VGA</td>
<td>Video Graphics Array</td>
</tr>
<tr>
<td>VOIP</td>
<td>Voice Over Internet Protocol</td>
</tr>
<tr>
<td>VPN</td>
<td>Virtual Private Network</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WAP</td>
<td>Wireless Application Protocol</td>
</tr>
<tr>
<td>WIFI</td>
<td>Wireless fidelity</td>
</tr>
<tr>
<td>WMV</td>
<td>Windows Media Video</td>
</tr>
<tr>
<td>WPM</td>
<td>Words Per Minute</td>
</tr>
<tr>
<td>WORM</td>
<td>Write Once Read Many</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Mark-up Language</td>
</tr>
<tr>
<td>XMF</td>
<td>Extensible Music File</td>
</tr>
<tr>
<td>XHTML</td>
<td>Extensible Hyper Text Mark-up Language</td>
</tr>
</tbody>
</table>

1. What is the Full form of SMTP in Computer aspects? (RRB Assistant)
(1) Switched Mail Transmitting Protocol
(2) Simple Mail Transfer Protocol
(3) Standard Message Transfer Protocol
(4) Simple Message Telegramming Protocol
(5) Switched Mode Technology Protocol

2. What does JAR stand for? (RBI Asst. Mains)
(1) Jumper
(2) Java Application Resource
(3) Java Arsenal
(4) Java Virtual Machine
(5) Java Archive

**Answer keys**

1. (2) 2. (5)

**Solutions**

1. SMTP stands for Simple Mail Transfer Protocol. SMTP is a set of communication guidelines that allow software to transmit an electronic mail over the internet is called Simple Mail Transfer Protocol. It is a program used for sending messages to other computer users based on e-mail addresses.

2. JAR stands for "Java ARchive". A JAR file is a zip-file which contains a couple of class files and a text file containing some meta information. JAR files can be used to bundle a Java library containing many classes into a single file or to bundle a Java application into a so-called executable JAR file.