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Unit-8

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NTA UGC NET PAPER 1 STUDY MATERIAL

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Information & Communication Technology (ICT)

Computer: A computer is a truly amazing machine that performs a specified sequence of operations as per the set of instructions (known as programs) given on a set of data (input) to generate desired information (output).

A complete computer system consists of four parts:

Hardware: Hardware represents the physical and tangible components of the computer.

Software: Software is a set of electronic instructions consisting of complex codes (Programs) that make the computer perform tasks.

User: The computer operators are known as users.

Data: Consists of raw facts, which the computer stores and reads in the form of numbers.

Functionalities of a computer

Any digital computer carries out five functions in gross terms:

- Takes data as input.
- Stores the data/instructions in its memory and use them when required.
- Processes the data and converts it into useful information.
- Generates the output
- Controls all the above four steps.

The following features characterize this electronic machine:

- Speed
- Accuracy
- Storage and Retrieval
- Reliability
- Flexibility
- Low cost
- Repeated Processing Capabilities

Applications of Computer

Following list are various applications of computers in today's arena.

- Business
- Banking
- Insurance
- Education
- Marketing
- Health Care
- Engineering Design
- Military
- Communication
- Government

Following are the main five generations of computers:

S. No.	Generation & Description
1	First Generation (1946-1959) - Vacuum tube based
2	Second Generation (1959-1965) - Transistor based
3	Third Generation (1965-1971) - Integrated Circuit based
4	Fourth Generation (1971-1980) - VLSI microprocessor based
5	Fifth Generation (1980-onwards) - ULSI microprocessor based

Computer hardware consists of the following components:

1. CPU and
2. Peripheral (Input & Output Devices)

1. **CPU (Central Processing Unit):**

CPU is considered as the brain of the computer. It performs all types of data processing operations, stores data, intermediate results and instructions (program). It controls the operation of all parts of computer.

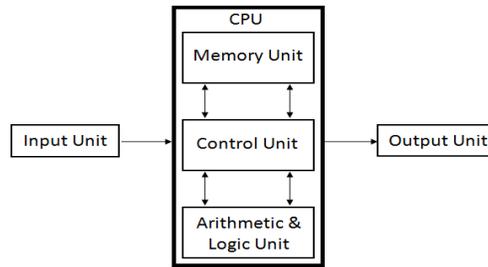


Fig: The relationship between different hardware Components

[A] CPU itself has following three components:

- **ALU (Arithmetic Logic Unit):** When the control unit encounters an instruction that involves mathematical calculation or decision/logic, it passes the control to the second component, i.e., the arithmetic logic unit (ALU). The ALU includes a group of registers - memory locations built directly into the CPU - that are used to hold data that are being processed by the current instruction.
- **Registers:** The register is the smallest high-speed storage area in the CPU. All data must be represented in a register before it can be processed.
- **Control Unit:** This unit controls the operations of all parts of computer but does not carry out any actual data processing operations

[B] Primary memory consists of mainly two types of memories:

1. **Random Access Memory (RAM):** RAM is the internal memory of the CPU for storing data, program and program result. It is read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence a backup uninterruptible power system (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

There are mainly three types of RAM available:

- I. **Dynamic Random Access Memory (DRAM):** A type of physical memory used in most personal computers. The term dynamic indicates that the memory must be constantly refreshed (reenergized) or it loses its contents. This type of memory is more economical.

- II. **Static Random Access Memory (SRAM):** A type of memory that is faster and less volatile than DRAM, but requires more power and is more expensive. The term static is derived from the fact that it does not need to be refreshed like DRAM.
 - III. **Synchronous Dynamic Random Access Memory (SDRAM):** A type of DRAM that can run at much higher clock speeds.
2. **Read Only Memory (ROM):** The memory from which we can only read but can not write on it . This type of memory is **non-volatile**. The information is stored permanently in such memories during manufacture. A ROM, stores such instructions that are required to start a computer. This operation is referred to as bootstrap.

There are mainly three types of ROM available:

- a. **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.
- b. **EPROM (Erasable and Programmable Read Only Memory):** The EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes. Usually, an EPROM eraser achieves this function.
- c. **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 ms (milli second).

Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address which varies from zero to memory size minus one.

Memory is primarily of three types: -

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

Primary Memory/Main 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.

Secondary Memory: This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing data/Information permanently.

A. Secondary Storage (External Storage Devices): Floppy diskettes, hard disk, tapes and optical disks come under the category of external storage devices or ancillary storage devices. These devices are very sensitive to environmental conditions (humidity and temperature) as well as to external magnetic fields and need to be stored carefully.

- a. **Floppy Disk:** Floppy disks are primarily used on PCs. Information on a floppy disk is recorded in the magnetized states of particles of iron oxides evenly placed upon concentric circles known as tracks.
- b. **Hard Disk:** It is a non-removable enclosed magnetic disk included in most PCs. It contains a stack of metal platters, each coated with iron oxide, that spin on a spindle and the entire unit is encased in a sealed chamber.
- c. **Magnetic Tape:** This is plastic tape, usually made of Mylar that is coated with iron oxide, thereby enabling the introduction (writing); retention (memory) and reading of magnetically recorded information. The best use of tape storage is for data that you do not use very often.

2. Peripherals:

Peripheral devices are devices connected to the computer externally. If a peripheral device is disconnected, the computer will still be able to work; only functions performed by this peripheral device will not be available.

Mainly there are following types of peripheral devices: -

- A. **Input Devices (How to tell it what to do):** This unit makes link between user and computer. The input devices translate the information into the form understandable by computer.
- B. **Keyboard-** The most common and very popular input device which helps in inputting data to the computer
- C. **Mouse-** Mouse is the most popular pointing device and cursor-control device having a small palm size box with a round ball at its base which senses the movement of mouse and sends corresponding signals to CPU when the mouse buttons are pressed.
- D. **Joy Stick-** To move cursor position on a monitor screen. It is mainly used in Computer Aided Designing (CAD) and playing computer games.
- E. **Light pen-** It is used to select a displayed menu item or draw pictures on the monitor

screen.

- F. **Track Ball**- Mostly used in notebook or laptop computer, instead of a mouse. This is a ball which is half inserted and by moving fingers on ball, pointer can be moved
- G. **Scanner**- A scanner allows you to scan printed material and convert it into a file format that may be used within the PC.
- H. **Digitizer**- It converts analog information into digital form.
- I. **Microphone**-Microphone is an input device to input sound that is then stored in digital form.
- J. **Magnetic Ink Card Reader (MICR)**-MICR input device is generally used in banks because of a large number of check to be processed every day.
- K. **Optical Character Reader (OCR)**- OCR scans text optically character by character, converts them into a machine readable code and stores the text on the system memory.
- L. **Bar Code Reader**- A device used for reading bar coded data (data in form of light and dark lines). Bar coded data is generally used in labeling goods, numbering the books.
- M. **Optical Mark Reader(OMR)**- A special type of optical scanner used to recognize the type of mark **made** by pen or pencil.
- N. **Output Devices: (How it shows you what it is doing)** Output devices translate the computer's output into the form understandable by users.
- O. **Monitors**: Monitors, commonly called as Visual Display Unit (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

There are two kinds of viewing screen used for monitors.

- a. **Cathode-Ray Tube (CRT)**: The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity, or resolution.
- b. **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.

Printer: Printer is an output device, which is used to print information on paper.

- a. **Impact Printers**: The impact printers print the characters by striking them on the ribbon which is then pressed on the paper.
- b. **Non-Impact Printers**: Non-impact printers print the characters without using ribbon. These printers print a complete page at a time, so they are also called as Page Printers. Laser Printers, Inkjet Printers.

Note:

- **Data:** Data can be defined as a representation of facts, concepts or instructions in a formalized manner which should be suitable for communication, interpretation, or processing by human or electronic machine.
- **Information:** Information is organized or classified data which has some meaningful values for the receiver. Information is the processed data on which decisions and actions are based.
- **Data Processing Cycle:** Data processing is the re-structuring or re-ordering of data by people or machine to increase their usefulness and add values for particular purpose. Data processing consists of basic steps input, processing and output.

These three steps constitute the data processing cycle.

- **Input** -Input data is prepared in some convenient form for processing. The form will depend on the processing machine. For example, when electronic computers are used, the input data could be recorded on any one of several types of input medium, such as magnetic disks, tapes and soon.
- **Processing** - In this step input data is changed to produce data in a more useful form. For example, paychecks may be calculated from the time cards, or a summary of sales for the month may be calculated from the sales orders.
- **Output** - The result of the proceeding processing step is collected. The particular form of the output data depends on the use of the data. For example, output data may be pay-checks for employees.

Language Processors:

Assembler: This language processor converts the program written in assembly language into machine language.

Interpreter: This language processor converts an HLL (High Level Language) program into machine language by converting and executing it line by line.

Compiler: It also converts the HLL program into machine language, but the conversion manner is different. It converts the entire HLL program in one go, and reports all the errors of the program along with the line numbers.

Classification of Computers:

Computers can be broadly classified by their speed and computing power:

Sr. No.	Type	Specifications
1	PC (Personal Computer)	It is a single user computer system having moderately powerful microprocessor.
2	WorkStation	It is also a single user computer system which is similar to personal computer but have more powerful microprocessor.
3	Mini Computer	It is a multi-user computer system which is capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.
4	Main Frame	It is a multi-user computer system which is capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.
5	Supercomputer	It is an extremely fast computer which can execute hundreds of millions of instructions per second.

Following are the main memory storage units:

S.No	Unit	Description
1	Bit (Binary Digit)	A binary digit is logical 0 and 1 representing a passive or an active state of a component in an electric circuit.
2	Nibble	A group of 4 bits is called nibble .
3	Byte	A group of 8 bits is called byte . A byte is the smallest unit which can represent a data item or a character. (1 byte = 8 bits)
4	Word	A computer word, like a byte, is a group of fixed number of bits processed as a unit which varies from computer to computer but is fixed for each computer. The length of a computer word is called word-size or word length and it may be as small as 8 bits or may be as long as 96 bits. A computer stores the information in the form of computer words.

Few higher storage units are following:

S.No	Unit	Description
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.		
1	Kilobyte (KB)	1 KB = 1024 Bytes
2	Megabyte(MB)	1 MB = 1024 KB
3	GigaByte (GB)	1 GB = 1024 MB
4	TeraByte (TB)	1 TB = 1024 GB
5.	PetaByte (PB)	1 PB = 1024 TB

Software

Software: software represents the set of programs that govern the operation of a computer system and make the hardware run. **There are two types of software**

System Software: The system software is collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software are generally prepared by computer manufactures. System software serves as the interface between hardware and the end users. **Examples:** Operating System, Compilers, Interpreter, Assembler etc.

Application Software: It is the set of programs necessary to carry out operations for a specified application.

Application software can subdivide into three categories:

A. Packages:

Packages	
Word Processing	A package that process textual matter and creates organized and flawless documents.
Spreadsheets	An electronic spreadsheet is a program that accepts data in a tabular form and allow users to manipulate , calculate, analyze data in the desired manner.
Database Management Systems	DBMS is a package that can handle and manage bulk of stored data.
Desktop Publishing Software	Handles page layout by combining the functions of a traditional typesetter and a layout artist.
Graphics, Multimedia and Presentation	Application software that manipulates images is known as Graphics software.

applications	
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B. **Utilities:** Utilities are those application programs that assist the computer by performing housekeeping functions like backing up disk or scanning viruses etc.

Utilities	
Text Editor	Program is used for creating, editing text files.
Backup Utility	Program facilities the backing-up of disk.
Compression Utility	Large files can be compressed so that it takes less storage area.
Disk Defragmentor	It speeds up disk access by rearranging the files and free space on your computer.
Antivirus Software	It scans yours disk for viruses and removes them if any virus is found.

C. **Customized Software:** This type of software is tailor-made software according to a user's requirement.

Number System

When we type some letters or words, the computer translates them in numbers as computers can understand only numbers. A computer can understand positional number system where there are only a few symbols called digits and these symbols represent different values depending on the position they occupy in the number.

A value of each digit in a number can be determined using

- ☐ The digit
 - ☐ The position of the digit in the number
 - ☐ The base of the number system (where base is defined as the total number of digits available in the number system).
1. **Decimal Number System:** The number system that we use in our day-to-day life is the decimal number system. Decimal number system has base 10 as it uses 10 digits from 0 to 9. In decimal number system, the successive positions to the left of the decimal point represent units, tens, hundreds, thousands and soon.
 2. **Binary Number System:** Uses two digits, 0 and 1, also called base 2 number system . Each position in a binary number represents a 0 power of the base (2). Last position in a binary number represents a x

- power of the base (2).
- Octal Number System:** Uses eight digits, 0,1,2,3,4,5,6,7, also called base 8 number system, Each position in an octal number represents a 0 power of the base (8).
 - Hexadecimal Number System:** Uses 10 digits and 6 letters, 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F. Letters represents numbers starting from 10. A = 10, B = 11, C = 12, D = 13, E = 14, F = 15. Also called base 16 number system. Each position in a hexadecimal number represents a 0 power of the base (16).

Number Conversion

There are many methods or techniques which can be used to convert numbers from one base to another. We'll demonstrate here the following-

- ❑ **Decimal to Binary System**
- ❑ **Binary to Decimal**

Decimal to Binary System

Steps:-

Step 1 - Divide the decimal number to be converted by the value of the newbase.

Step 2 - Get the remainder from Step 1 as the rightmost digit (least significant digit) of new base number.

Step 3 - Divide the quotient of the previous divide by the newbase.

Step 4 - Record the remainder from Step 3 as the next digit (to the left) of the new base number.

Repeat Steps 3 and 4, getting remainders from right to left, until the quotient becomes zero in Step 3. The last remainder thus obtained will be the most significant digit (MSD) of the new base number.

Example

Decimal Number: $(29)_{10}$

Calculating Binary Equivalent:

Step	Operation	Result	Remainder
Step 1	29 / 2	14	1
Step 2	14 / 2	7	0
Step 3	7 / 2	3	1
Step 4	3 / 2	1	1
Step 5	1 / 2	0	1

As mentioned in Steps 2 and 4, the remainders have to be arranged in the reverse order so that the first remainder becomes the least significant digit (LSD) and the last remainder becomes the most significant digit (MSD).

Binary to Decimal System

Steps:-

Step 1 - Determine the column (positional) value of each digit (this depends on the position of the digit and the base of the number system).

Step 2 - Multiply the obtained column values (in Step 1) by the digits in the corresponding columns.

Step 3 - Sum the products calculated in Step 2. The total is the equivalent value in decimal.

Example

Binary Number: $(11101)_2$ Calculating Decimal Equivalent:

Step	Binary Number	Decimal Number
Step 1	$(11101)_2$	$((1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0))_{10}$
Step 2	$(11101)_2$	$(16 + 8 + 4 + 0 + 1)_{10}$
Step 3	$(11101)_2$	$(29)_{10}$

Binary Number: $(11101)_2$ = Decimal Number: $(29)_{10}$

Networking

The basics of internet, intranet, email or audio and video conferencing can be better understood if we understand first the computer network. A computer network is the backbone internet and related activities.

Networking

A network is simply an interconnection of one or more computers for the purpose of sharing information and resources (printers, storage devices, and application). Computer

Networks means interconnected set of autonomous system that permit distributed processing to information.

Five components:

1. Sender Computer
2. Sender equipment (Modem)
3. Communication Channel (Telephone Cables or wireless device)
4. Receiver Equipment (Modem)
5. Receiver Computer

Classification based on Geographical Coverage:

Local Area Network (LAN): A local area network is relatively smaller and privately-owned network with the maximum span of 10 km.

Metropolitan Area Network (MAN): MAN is defined for less than 50 Km and provides regional connectivity within a campus or small geographical area.

Wide Area Network (WAN): A wide Area Network (WAN) is a group Communication Technology provides **no limit** of distance.

Types of Network

1. **Point to Point Network:** When a packet is sent from one router to another intermediate routers, the entire packet is stored at each intermediate router, stored there till the output line is free and then forwarded. A subnet using this principle is called **point to point** or **packet switched network**.

Topologies for a point to point Subnet

- a) **Star:** Each device has a dedicated point to point link only to a central controller, usually called a hub.
 - b) **Tree:** A tree topology is a variation of a star.
 - c) **Ring:** Each device has a dedicated point to point line configuration only with the two devices on either side of it.
 - d) **Bus:** One long cable act as a backbone to link all the devices in the network.
2. **Broadcast Networks:** Broadcast networks have a single communication

channel that is shared by all the machines on the network.

Intranet

An intranet can be an excellent method for sharing organizational information and creating internal communication channels. An intranet is an ideal way to communicate in a secure environment. An intranet provides a way to communicate with a common technology.

Intranets allow organizations to make effective use of their digital organizational information resources, offering interoperability, ease of use, security, and cost-effectiveness.

Intranet is:

- A collection of resources to which only internal users have access.
- A private network inside an organization, similar to the Internet, but which is for internal use only, and is not accessible to the public.
- Users of an Intranet can exchange electronic mail (email), send files (ftp), browse web (WWW) pages, and connect to any other computer. Just like the normal internet, however, only people within an organization can use the intranet.
- Intranets are often separated from the Internet by using a firewall.
- Organizations use Intranets to manage projects, provide employee information, distribute data and information, internal communication.

Advantages of an Intranet:

- ❑ Data can be stored centrally
- ❑ Allows easier maintenance of data
- ❑ Web-based interface for access o common technology for communication
- ❑ Ability to access from anywhere in the world

Internet

The **Internet** is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide. It also known as “**network of networks**” that consists of millions of private, public, academic, business, and government networks.

Various applications of internet are:

- ❑ Exchange messages using e-mail (Electronic mail).
- ❑ Transfer files as well as software.
- ❑ Browse through information on any topic on web.
- ❑ Communicate in real time (chat) with others connected to the Internet.
- ❑ Search databases of government, individuals and organizations.
- ❑ Read news available from leading news groups.
- ❑ Send or receive animation and picture files from distant places.
- ❑ Set up a site with information about your company's products and services.

The **World Wide Web** commonly known as the Web or www developed by **Tim Berners – Lee** in 1989, is a system of interlinked hypertext documents that are accessed via the Internet. These multimedia pages are ever changing.

A **web browser** (commonly referred to as a browser) is a software application for retrieving, presenting and traversing information resources on the World Wide Web.

Ex. WorldWideWeb (First Web Browser), Netscape, Internet Explorer, Opera, Mozilla Firefox, Safari (Apple), Google Chrome, UC Browser etc.

Various features of a Web Browser are:

Menu bar: The menu bar, located at the very top of the screen, can be accessed using the mouse. Actions that are in black can be performed, while actions that cannot be performed will be in gray or lightened.

Tool bar: The tool bar is located at the top of the browser; it contains navigational buttons for the Web. Basic functions of these buttons include:

<u>Command</u>	<u>Function</u>
Home	Opens or returns to starting page
Back	Takes you to the previous page
Forward	Takes you to the next page
Print	Prints current page
Stop	Stops loading a page
Reload	Refresh/redisplays current page
Search	Accesses search engine

- ❓ **Location bar:** The location bar, below the tool bar, is a box labelled "Location," "GoTo," or "Address." You can type in a site's address and press the Return or Enter key to open the site.
- ❓ **Status bar:** The status bar is located at the very bottom of the browser window. You can watch the progress of a web page download to determine if the host computer has been contacted and text and images are being downloaded.
- ❓ **Scroll bar:** The scroll bar is the vertical bar located on the right of the browser window. You can scroll up and down a web page by placing the cursor on the slider control and holding down the mouse button.
- ❓ A **website** is a set of related web pages served from a single web domain.
- ❓ **Uniform Resource Locator** abbreviated as URL is the Address for web sites. Most of them begin with http (Hyper Text Transfer Protocol), followed by a colon and two slashes. In most web browsers, the URL of a web page is displayed on top inside an address bar. An example of a typical URL would be "<http://www.studyofeducation.com>".
- ❓ A **Hyperlink** is a reference to data that the reader can directly follow either by clicking or by hovering or that is followed automatically.
- ❓ **Downloading** means to receive data to a local system from a remote system, or to initiate such a data transfer.
- ❓ **Uploading** refers to the sending of data from a local system to a remote system such as a server or another client with the intent that the remote system should store a copy of the data being transferred.

ELECTRONIC MAIL (e-mail)

Electronic Mail (e-mail) was invented by "John Von Neumann". Electronic Mail transfers the data from one system to another system in the form of messages (text), pictures (images), multimedia messages.

An e-mail address normally consists of Three parts.

1. Name of the User
2. "@" Sign
3. It comes after @ sign and it is the name of the DNS.

Example: abcd@gmail.com

abcd (user name) and gmail.com (Domain name System)

In the e-mail window, you can find "folder Pane" at the left side of the window. It has set of folders named as Composed mail, Inbox, Out Box, Sent Items, Drafts, Trash, Spam etc.,

- **Inbox:** used to store in-coming mail.
- **Sent Items:** used to store mail that has already been sent.
- **Deleted Items (Trash):** used to store deleted mail up to 30 days.
- **Draft folder:** use to store mail that is not yet complete.
- **Spam:** used to store the unsolicited bulk e-mail up to 30 days.
- **Compose Mail:** use to create a new mail.

When you start to compose an e-mail, the following activities have to done:

- ❑ **To:** To type the e-mail address of the person to whom you want to send a mail in this box.
- ❑ **Subject:** To type a few words about the subject of the letter you want to write.
- ❑ **CC (Carbon Copy):** To type the e-mail address of the other recipients in this box, each address is separated by a comma (.). When you complete the mail and click the "Send" button, then the mail will automatically be sent to all the recipients. Here, all the recipients will know who the other recipients are.
- ❑ **BCC (Band Carbon Copy) or (Blind Curtsey Copy):** If you don't want them to know who else have received copies, you can type the addresses in the BCC text box. In this case, only you (the sender) will know the identity of all the recipients of mail.
- ❑ **Reply:** You can send your reply using the same window. The subject box will have the same subject, but with the words "Re:" before it.
- ❑ **Forward:** You can send the forward message using the same window. The subject box will have the same subject, but with the words "Forward:" before it. or
- ❑ An **email attachment** is a computer file sent along with an email message. One or more files can be attached to any email message and be sent along with it to the recipient. The first email was sent by **Ray Tomlinson** to himself in 1971.
- ❑ The **Drafts folder** retains copies of messages that you have started but are not yet ready to send.

Important points of e-mail

Hotmail, a free e-mail service provided by Microsoft which was established in 1995 was co - founded by an Indian American entrepreneur **Sabeer Bhatia** along with **Jack Smith** in **July of 1996**.

An **Internet Protocol address** (also known as an **IP address**) is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network. It acts as an identifier for a computer. It is a unique address for every computer.

Top-level domain: Each part of a domain name contains certain information. The first field is the host name, identifying a single computer or organization. The last field is the top-level domain, describing the type of organization and occasionally country of origin associated with the address. For e.g. - .com – **Commercial**, .edu – **Educational**.

Protocols:

- ❑ Transmission Control Protocol (TCP)
- ❑ User Datagram Protocol (UDP)
- ❑ Internet Protocol (IP)
- ❑ Post Office Protocol (POP3)
- ❑ Hyper Text Transfer Protocol (HTTP)
- ❑ File Transfer Protocol (FTP)
- ❑ Internet Control Message Protocol (ICMP)
- ❑ Internet Message Access Protocol (IMAP)

Audio conferencing

Audio conferencing is where two or more people in different locations use technology like a conference bridge to hold an audio call. Audio conferencing is different from a traditional phone in in that all participants dial into a central system that connects them instead of directly dialing each other. Audio conferencing aims at achieving communications and collaboration simultaneously.

Many audio-conferencing products may also come with online collaboration elements standard or optional, like screen-sharing capabilities, to further enhance the value of audio meetings.

Video conferencing

Video conferencing is a technology-enabled type of meeting where two or more people, in different geographic locations, conduct live visual conferences through the internet for the purpose of communicating and collaborating. Video conferencing software (or hardware) enables transmission of high-quality audio, static images—sometimes full-motion video images—and text-based messages between multiple locations. As long as they have a webcam (an embedded camera), a desktop, laptop or mobile phone device can be used for video conferencing.

Web Conferencing

Web Conferencing is an online service by which you can hold live meetings, conferencing, presentations and trainings via the internet (particularly on TCP/IP connections). Users can connect to the conference either by telephone or using the computer's speakers and microphone through a VoIP connection.

Web conferencing usually allows real time point-to-point communication as well as multitask communications from one sender to many receivers in separate locations. Depending on the service, either an application (additional software) is downloaded and installed or a web-based application is launched in the attendee's browser.

Web conferencing software or website makes collaboration easier, with the following common features:

Whiteboard: which allows you or your attendees to draw or annotate a shared screen.

Screen sharing, so you can share with other conference attendees something on your local workstation.

Audio conferencing, for times when an audio-only call is sufficient.

Webinars, which allows you to present to a group while maintaining control over who can contribute (i.e., every attendee can hear you, but no one else can present during the session).

Online meetings, which are basically scheduled conferences that include the ability for you to send out invitations and block off time on the requested attendees' calendars.

Mobile access or apps, so that people can participate even when on the go.

Real-time chat, which allows people to text type during the conference. This is useful for sharing links during discussions and making notes.

Most popular Audio and Video Conferencing Software or website

☐ Skype

- ❑ Zoom
- ❑ GoToMeeting
- ❑ Workplace by Facebook
- ❑ CISCO WebEx
- ❑ Hangout Meets
- ❑ ZOHO
- ❑ Google Meet

E-Commerce

E - Commerce (Electronic Commerce): E-Commerce is the buying and selling of goods and services on the internet. The visitor to the site can sell or buy any product or service online. The transactions are enabling through credit cards, Debit cardsetc.

E-Business (Electronic Business): E-Business is the administration of conducting business via the Internet. This would include the buying and selling of goods and services, along with providing technical or customer support through the Internet. E-Business is used in conjunction with E- Commerce but includes services in addition to the sale of goods.

E-Administration:The use of ICTs (Information and Communication technologies) to modernize the state, the creation of data repositories for MIS (Management Information Systems), computerisation of records.

E-Services: the emphasis here is to bring the state closer to the citizens. Examples include provision of online services. E-Services and E-Administration together constitute what is generally termed e- governance.

E-Governance: The use of IT to improve the ability of government to address the needs of society. It includes the publishing of policy and programme related information to transact with citizens. It extends beyond provision of on-line services and use of IT for strategic planning and reaching development goals of the government.

E-Democracy: The use of IT to facilitate the ability of all sections of society to participate in the governance of the state. The remit is much broader here with a stated emphasis on transparency', accountability and participation. Examples are online

disclosure policies, online grievance redress forums and e-referendums.

Electronic Funds Transfer (EFT): A cashless approach used to pay for goods and services. Electronic signals between computers are used to adjust the accounts of the parties involved in a transaction. Electronic Funds transfer (EFT) is also known as "Electronic Banking (E-Banking)". E- Banking is the use of electronic means to transfer funds directly from one account to another, rather than by cheque or cash.

Internet Banking or Online Banking: internet Banking allows customers to conduct financial transactions on a secure website operated by their retail or virtual bank, credit union or building society.

E-Marketing: E-Marketing is also known as Internet Marketing, Digital Marketing, Web Marketing, Online Marketing, Search Marketing, I-Marketing (Internet Marketing) is the Marketing of products or services over the Internet.

E-Procurement (Supplier exchange) : E-Procurement is more than just a system for making purchases online. A properly implemented system can connect companies and their business processes directly with suppliers while managing all interactions between them. Examples are bids, management correspondence, questions and answers, previous pricing and multiple emails sent to multiple participants.

Types of E-Commerce:

Business to Customer (B2C): The basic concept of this model is to sell the product online to the customers. It provides direct selling through online. B2C is the indirect trade between the company and consumers. Directly interact with the customers is the main difference with other business model.

Business to Business (B2B): It is similar to manufacturer issuing goods to the retailer or wholesaler. This model defines that Buyer and seller are two different entities. It consists of longest form of E- Commerce. It is one of the cost-effective ways to sell out product throughout the world.

Customer to Customer (C2C): It helps the online dealing of goods or services among people. though there are no major parties needed but the parties will not fulfill the transactions without the program which is supplied by the online market dealer such as eBay.

Peer to Peer (P2P): It is a discipline that deal itself, which assists people to instantly shares related computer files and computer sources without having to interact with

central webserver.

M-Commerce: This model deals with conducting the transactions with the help of mobile. The mobile consumers can interact each other and can lead the business. M-Commerce (Mobile Commerce) involves the change of ownership or rights to utilize goods and related services.

Companies and Their Founders:

Microsoft	Bill gates
Google	Sergey Brain and Larrypase(1997)
Yahoo	Jerry Yang andDavid Filo(1994)
Facebook	Mark Zukerberg
Apple	Steve Jobs, Steve Wozniak and Ronald Wayne
Oracle	Larry Ellison, Bob Miner and Ed Oates
Wikipedia	Jimmy Wales and Larry Sanger
Twitter	Jack Dorsey, Noah Glass, Biz Stone and Evan Williams
Instagram	Kevin Systrom and Mike Krieger
WhatsApp	Brian Acton and Jan Koum
YouTube	Chad Hurley, Steve Chen and Jawed Karim

COMPUTER SECURITY

Security: Security controls access to data in files and permits only authorized use of terminals and other equipment. Control is usually through various levels of passwords assigned on the basis of need to know.

Typical approaches to improving Computer security can include the following:

- ❑ Physically limit access to computers to only those who will not compromise security.
- ❑ Hardware Mechanisms that impose rules on computer programs, thus avoiding depending on computer programs for computer security.
- ❑ Operating system Mechanisms that impose rules on programs to avoid trusting Computer Programs.
- ❑ Programming strategies to make computer programs dependable and resist

subversion.

Security Tools:

Firewall: A fire wall is a set of related programs, located at a network gateway server, that protects the resources of a private network from users of other networks. Firewall can either be hardware devices or software programs. They provide protection from Online intrusions. A firewall is designed to prevent unauthorized Internet users from accessing your computer. All messages entering your Computer from the Internet pass through the firewall which examines each message. The firewall blocks any message that was not specifically requested by your system.

Encryption: It can be used to protect the message from unauthorized users. It can be done in several ways by switching the characters around, replacing characters with others, and even removing characters from the message.

Cryptographic Techniques: It can be used to defend data in transit between systems reducing the probability that data exchanged between systems can be intercepted or modified. Secure crypto processors can be used to leverage physical security techniques into detecting the security of the system. Strong authentication techniques can be used to ensure that communication end-points are who they say they are.

Intrusion - Detection - System: It can be scan a network for people that are on the network but who should not be there or redoing things that they should not be doing. For example, trying a lot of pass- words to gain access to the network.

Pinging: The Ping application can be used by potential crackers to find if an IP address is reachable. If a cracker finds a computer, they can try a port scan to detect and attack services on that computer.

Anti-Virus Software: Anti-virus software consists of computer programs that attempt to identify, thwart and eliminate computer viruses and other malicious software (Malware). The term "Antivirus" is used because it is designed exclusively to combat computer viruses.

Antivirus software typically uses two different approaches to accomplish this:

- Examining (Scanning) files to look for known viruses matching definitions in a virus dictionary.
- Identifying suspicious behaviour from any computer program which might indicate infections.

VIRUS (Vital Information Resource Under Siege): The full form is "Vital Information Resource Under Siege". A computer virus is a computer program that spreads by

inserting copies of itself into other executable code or documents. Virus program that runs on your computer without your knowledge and can cause damage to your files. A common way to receive a virus is through an attachment via e-mail.

Worm: Worm is a self-replicating program. It replicates itself to new computers using the flaws and then begins scanning and replicating again. The difference between a virus and worm is that a worm does not create copies of itself on one system. It propagates through computer networks.

Trojan Horse: It is a program in which malicious or harmful code is contained inside apparently harmless programming or data in such a way that it can get control and do its chosen form of damage. Trojan Horses cannot replicate automatically. A Trojan horse can be used to setup a back door in a computer system so that the intruder can return later and gain access.

Malware (Malicious Software): It is a software designed specifically to damage or disrupt a system such as a virus or Trojan horse.

Spyware: Spyware is a software that performs actions such as advertising, collecting personal data, or changing the configuration of your computer, usually without obtaining your consent. Spyware that displays advertisements and tracks your personal information is known as "Adware".

Spam: E-mail spam also known as "Junk e-mail" or "Unsolicited Bulk e-mail (UBE)", is a subset of spam that involves nearly identical messages sent to numerous recipients by e-mail.

Phishing: Phishing is a fraudulent activity of acquiring the sensitive information by the use of a fake identity during electronic communication.

Spoofing: It occurs when the sender of an e-mail message pretends to be someone else, they falsely manipulate the "From" field in an e-mail. This is usually done to make you release sensitive information.

Key loggers: Key logger is a software program designed to record (log) every keystroke on the machine on which it runs. Key logger is also known as "Key Stroke logger" or "System Monitor".

Packet Sniffer: A packet sniffer is an application that captures TCP/IP data packets, which can maliciously be used to capture passwords and other data while it is in transit either within the computer or over the network.

Root Kit: A root kit is a computer program that enable administrator - level access to a

computer or computer network. A cracker installs a root kit on a computer after first obtaining user-level access, either by exploiting a known vulnerability or cracking a password. Once the root kit is installed, it allows the hacker to mask intrusion and gain root or privileged access to the computer.

Cybercrime: It contains all criminal offences which are committed with the aid of communication devices in a network.

example is:

Unauthorized access, malicious code, and denial-of-service attacks. Theft of service and certain financial frauds.

Spamming and copyright crimes, particularly those facilitated through peer-to-peer networks. Hacking, phishing, identify theft, child pornography, online gambling securities fraud.

Hacking: Hacking is the activity of programmatically gaining access to a computer application that is otherwise in accessible. The act of gaining an unauthorized access to a computer is known as "Hacking".

Hacker: A Hacker is someone involved in computer security specializing in the discovery of exploits in systems or in obtaining or preventing unauthorized access to systems through skills, tactics and detailed knowledge.

Polymorphic Virus: A polymorphic virus modifies its program code each time it attaches itself to another program or file.

ICT: General Abbreviation and Terminology

Abort: To stop a program or function before it has finished.

Algorithm: A set of instructions that provides a solution to a given problem.

Animation: A simulation of movement created by displaying a series of pictures, or frames. For example, cartoons on television.

ANSI: American National Standards Institute, a powerful industry association of USA, promoting Programming language standards.

Antivirus: Program A utility that searches a hard disk for viruses and removes any, that is found.

Architecture: A design. It can refer to either hardware or software or to a combination of hardware and software. The architecture of a system defines its broad outlines.

ASCII: American Standard Code for Information Inter change. This is a seven/eight bit code widely used in computers for the transfer of data.

Bandwidth: The amount of data that can be transmitted in a fixed amount of time. It is usually expressed in bits per second (bps) or bytes per second.

Bit: The smallest unit of information in computer system. Bit is short for binary digit; either a "1" or a "0".

Boot: The process of getting the computer started.

Byte: A byte is made up of 8 bits. The amount of memory it takes to store a single character.

Cache: A separate area of Primary Memory (RAM) where the computer stores a copy of frequently used information for quick access. This is meant to speed up the operation of the hard disk.

CD-ROM: Compact Disk-Read Only Memory. This is a permanent storage device used to store large quantities of information that need not be changed.

CGA: Color Graphics Adapter. Low-resolution screen (640x200 pixels) with color capability.

Character: A number, letter, symbol, or punctuation mark.

Chip: A small piece of silicon containing thousands or millions of electrical elements. Also called an Integrated Circuit (IC).

Compatible: The ability of one device or program to work with another device or program. For example, a printer and a computer are said to be compatible if they can be connected to each other.

Conventional Memory: The first 640K of electronic Memory (RAM) in a computer used to run OS and applications.

Debug: In computer related systems, fixing software related problem is known as debugging.

Digitize: To scan a piece of artwork in very fine detail and store it in a form that computer understands.

DOS: It stands for Disk Operating System. It is a single user operating system.

DVD: Digital Versatile Disc or Digital Video Disc

Dynamic: Refers to actions that take place at the moment they are needed rather than in advance.

EDP: Electronic Data Processing.

E-Mail: Electronic Mail. A facility to send electronic messages to another person on a computer network.

End-User: The end user is the individual who uses the product after it has been fully developed and marketed.

EPROM: Erasable Programmable Read Only Memory. A type of ROM that can be programmed or reprogrammed usually by exposing a normally covered sector to UV-Light.

Extended Memory: Memory in addition to conventional memory used to run and manage applications; together with expanded memory, it helps PCs to address increased amounts of data in memory.

Fax/Facsimile: A way of transmitting copies of documents over telephone lines. Fax is short for Facsimile.

Gigabyte: Abbreviated as GB, is equal to 1024 MB. GUI Graphical User Interface. A user interface that works visually and is based on the selection of actions using a mouse or a similar pointing device to click on icons or to pick options from menus; see also icon.

Hertz: A unit of frequency that means Cycles per Second.

High Density: The amount of information a disk can hold. High Density disks hold more information than Double Density disks.

Hypertext: A method of presenting information so the user can view it in a non-sequential way, regardless of how the topics were originally arranged. It has now evolved as a flexible software technology to create electronic books provides fast and flexible access to search criteria and provides quick access to information in large documents.

HTML: Hyper Text Markup Language. A markup or structuring language used to describe Web and Intranet documents. It is used to define structure, appearance and placement of HTML elements including, fonts, graphics, text, hypertext links to other sites and many more details.

IBM: International Business Machines, a USA based multinational Company.

Icon: A graphical screen element that executes one or more commands when selected with a mouse or other pointing device

IDE: Integrated Device Electronics, a standard used for connecting hard drive to a computer. IDE hard drives are very common and relatively inexpensive.

Intel: The manufacturer of the most popular microprocessors or CPUs.

Intelligent: Printer combining laser, computer and photocopying technology.

Internet: The world's largest computer network that links many of the scientific, research and educational computers as well as commercial networks. The internet uses TCP/IP protocols, and computers on Internet can run on any operating system, like, several variations of UNIX, Windows NT, and VMS etc.

Intranet: In the most general sense, a private corporate network that uses Internet technology based software and TCP/IP protocol standards. Many companies use intranets for tasks as simple as distributing a company letter and for tasks as complex as posting and updating technical support bulletins to service personnel worldwide. An intranet does not always include permanent connection to Internet.

Kilobyte (K, KB) Approximately one thousand characters; actually 1024bytes.

LAN An acronym for local area network. A system of PCs that are located relatively near to each other and connected by wire so that individual users can cooperatively process information and share resources; see also WAN.

Laptop Computer: A portable computer, small enough to be held on a lap, but slightly larger than a notebook computer.

LED: Light Emitting Diode. An electronic device that lights up when electricity is passed through it.

Light Pen: An input device that allows a user to write on or point to a special pad or the screen of a pen-based computer, such as a PDA.

Macintosh: A PC based on a Motorola microprocessor employing GUI. Apple Macintosh has been in use since late eighties.

Macro: A symbol, name, or key that represents a list of commands, actions or keystrokes.

Math co-processor: Part of the microprocessor; a companion chip designed to perform complex calculations.

Megabyte (M, MB): Approximately one million characters; actually 1,048,576 bytes. A measure of memory or storage.

Megahertz (MHz): A measure of processing speed. The higher the value, the faster a computer can work.

Microprocessor: A single chip containing all the elements of a computer's CPU.

MIPS: Million Instructions Per Seconds, a unit for measuring the speed of a computer.

Mother Board: The main circuit board of a computer, which carries electrical signals to and from various parts of the computer.

Multimedia: A computer system that combines text, graphics, animation, music, voice and video media; may include stereo speakers as an output device.

Multiprocessing: It refers to a computer system's ability to support more than one process at the same time. It is also called multitasking.

Nibble: Half a byte i.e. 4bits.

Non-Volatile Memory: This is data storage that does not lose its contents on power off; for example, ROM.

Notebook Computer: A portable computer, approximately 8½ by 11 inches, that fits inside a briefcase.

Numeric keypad: The part of a keyboard that looks like an adding machine, with 10 digits and mathematical operators; usually located on the right side of the keyboard.

Office-Automation: The use of computer systems to execute a variety of office operations, such as word processing, accounting and Email.

Parallel Port: An outlet on a computer used to attach a device, such as a printer. A parallel port sends data (bits) down the wire side by side (parallel to each other).

Pentium: The fifth generation of microprocessors. The Pentium is 2 to 3 times faster than the 80486, the fourth generation of microprocessors.

Peripheral: Any piece of hardware attached to the outside of a computer. Examples are printers and modems.

Pixel: Short for "Picture Element". A Pixel is the smallest dot the computer can control on the screen.

Portable computer: A small computer that usually runs on batteries. In the categories of portable computers are laptop, notebook, sub-notebook and palmtop.

Protocol: In networking and communications, the formal specification that defines the procedures to follow when transmitting and receiving data. Protocol defines the format, timing, sequence and error checking used on the network.

Resolution: The size and quantity of dots that make up a printed page, screen or scanned image.

Runtime: Error An error that occurs during the execution of a program.

Scanner: An input device used to copy a printed document into a computer's memory in digital form, without requiring manual keying.

SCSI: Small Computer System Interface. A standard for connecting a hard drive to a computer.

Serial Port: An outlet on a computer used to attach a device, such as a modem. A serial port sends data (bits) down the wire one at a time (in a series).

Service Pack: It is an update to a software version that fixes an existing problem, such as a bug or provides enhancements to the product that will appear in the next version of the product.

TCP/IP: Transmission Control Protocol / Internet Protocol is a set of communication protocols that encompass media access, packet transport, session communications, file transfer, e-mail, and terminal emulation. TCP/IP is supported by a large number of H/W and S/W vendors and is available on many computer systems, from PCs to mainframes.

Troubleshoot: To isolate the source of a problem and fix it. In case of computer systems, troubleshoot is usually used when the problem is hardware related.

UNIX: A multiuser operating system.

Upgrade: A new version of a software or hardware product designed to replace an older version of the same product.

UPS: Uninterruptible Power Supply. It is a power supply that includes a battery to maintain power in the event of a power cut for several minutes to some hours.

Utility: A program that performs a very specific task, usually related to managing system resources.

Vector Graphic: A method of creating graphic images on a computer by telling it to draw lines in particular positions. An advantage of a vector graphic is that it can be enlarged or reduced in size without loss of sharpness or distortion. Most modern image creation and editing packages can save images in vector graphic format.

Video Card: An electronic circuit board inside a computer, which controls the display on the Monitor, i.e. the computer screens. Video cards are usually add-on cards inserted into expansion slots, although sometimes video circuitry is incorporated into the Motherboard. Usually referred to as a graphics card these days.

Videoconferencing or Video Conferencing: A computer-based communications system that allows a group of computer users at different locations to conduct a "virtual conference" in which the participants can see and hear one another as if they were in the same room participating in a real conference.

Videodisc: A technically obsolete Storage Medium, an Optical Disc, 12 inches in diameter, used mainly to store still images or video clips. Now replaced by CD-ROMs and DVDs. See CD-ROM, Digital Video Disc, Interactive Video (IV).

Videodisc Player: Equipment used for accessing information - usually still images or video clips - stored on videodiscs. Now technically obsolete.

Video Memory: The dynamic memory available for the computer's Display Screen. The greater the amount of memory, the greater the possible colour depth and resolution of the display. Also known as Video RAM (VRAM).

Virtual Learning Environment (VLE): A VLE is a Web-based package designed to help teachers create online courses, together with facilities for teacher-learner communication and peer-to-peer communication.

Virtual Reality: The simulation of an environment by presentation of 3D moving images and associated sounds, giving the user the impression of being able to move around with the simulated environment. Users wear helmets and visors that convey the images and sound and gloves that give them the experience of touching objects.

Virtual World: A type of online three-dimensional imaginary world or game in which participants and players adopt amazing characters or avatars and explore the world, engaging in chat or playing complex games. See Avatar, MMORPG, MUVE.

Virus: A virus is a nasty program devised by a clever programmer, usually with malicious intent. Viruses can be highly contagious, finding their way onto your computer's hard drive without your being aware of it and causing considerable damage to the software

and data stored on it.

Visual Display Unit (VDU): A Monitor connected to larger computers. Usually referred to as VDU. Rather an old-fashioned term nowadays, Display Screen being the current favoured term.

Vodcast: A contraction of Video Podcast. A type of Podcast that incorporates video as well as audio.

VoIP: Abbreviation for Voice over Internet Protocol, i.e. audio communication using the Internet instead of telephones. Skype and Ventrilo are examples of VoIP.

Volatile Memory: Used to describe the internal main Memory of a computer that loses its contents when power is switched off. RAM is volatile memory as the information is stored in memory chips as an electric charge.

W3C: Abbreviation for World Wide Web Consortium. An international non-profit organization which acts as a resource centre for the World Wide Web, and is active in setting technical standards.

WAN: Abbreviation for Wide Area Network. A network of computers located at geographically separate sites.

WAP: Abbreviation for Wireless Application Protocol. A system that enables you to browse online services, e.g. relating to information about the weather, traffic conditions, shopping, etc. via a special type of mobile phone. WAP is the mobile phone equivalent of the World Wide Web.

WAV: Short for Waveform Audio Format. A format for storing high-quality audio files. Somewhat hungry in terms of storage space compared to the MP3 and WMA audio file formats.

Web 2.0: Contrary to what many people think, Web 2.0 is not a new version of the World Wide Web. The term arose as the name of a series of conferences, the first of which was held in 2004: <http://www.web2summit.com>. Essentially, Web 2.0 is an attempt to redefine what the Web is all about and how it is used, for example new Web-Based communities using Blogs, Podcasts, Wikis and Social Networking websites that promote collaboration and sharing between users.

Webcam: A camera connected to a computer that enables it to transmit images and videos to the Internet.

WebCT: A Virtual Learning Environment (VLE). Blackboard and WebCT announced an agreement to merge in October 2005. Effectively, Blackboard has now taken over WebCT.

Weblog: The full form of the term Blog.

Webmail: A facility for creating, sending and receiving messages via the Internet.

Webmail offers an alternative to using email software such as Outlook or Eudora.

Webquest: A web quest is a task-oriented activity in which the learner draws on material from different websites in order to achieve a specific goal.

Web Server or Webservice: A computer or a software package running on a computer that delivers, i.e. serve. Every Web server has an IP Address and possibly a Domain Name. For example, if you enter the URL <https://www.scholarify.in> in your Browser, this sends a request to the Server whose domain name is scholarify.in. The server then fetches the page named index.htm and sends a copy of it to your browser. By far the most popular Web server software in use worldwide is the Open Source **Apache software**.

Website: An area on the World Wide Web where an organization or individual stores a collection of pages of material - Web pages. The pages are usually interlinked with one another and with other websites. Every website has a unique Web Address or URL. The full URL of the **study of education** website is <https://www.studyofeducation.com>

Wifi: Wireless Fidelity, also known as wireless networking, a way of transmitting information without cables that is reasonably fast and is often used for laptop computers within a business or a university or school campus instead of a Local Area Network (LAN) that uses cable connections.

Wiki: A website or similar online resource which allows anyone to set up a resource in which content can be created collectively. Its important feature is that it allows anyone who views the wiki to add to or edit the existing content as if they were adding to or editing, for example, someone else's Word document.

Wild Card or Wildcard: In a question-answer dialogue which aims not to be over-sensitive about spelling, the teacher may decide to allow for aberrations by declaring certain characters "wild".

Windows: The name of a range of several different Graphical User Interface (GUI) operating systems produced by the Microsoft Corporation. Windows 3.0 and Windows 3.1 were the first operating systems of this type, produced by Microsoft, to appear in the early 1990s. Microsoft Windows is currently the most widely used GUI for personal computers. It exists in various versions, e.g. Windows 95, 98, ME, NT, 2000 and XP.

Windows Explorer: Microsoft's tool, provided as part of Windows, that enables you to inspect and manage folders and files stored on your computer. My Computer is an alternative tool, also provided as part of Windows.

Wireless Mouse: A Mouse that does not require a cable connection to a computer, but which operates via infrared or radio signals.

Wizard: Software that guides the user step-by-step through a complex task, such as setting up software on a network or configuring a printer to output data in a special

format, e.g. for printing labels from a database program.

WMA: Abbreviation for Windows Media Audio. Microsoft's audio encoding format which offers high quality output with lower file sizes. See MP3, WAV, which are alternative audio file formats.

Word: A popular word-processing package, produced by Microsoft. See Word-processor.

Wordsnake: An exercise in which all the spaces in a sentence have been removed, the learner's task being to put the spaces back into the correct positions in the sentence.

Workstation: A term that is rather loosely used these days. Most people use it in the context of any computer that forms part of a Network. Formerly, this term was applied to a particular type of powerful computer used for scientific and engineering calculations, e.g. the Sun Workstation.

WorldCALL: The worldwide umbrella association for CALL. <http://www.worldcall.org>, which has the aim of helping countries that are currently underserved in the applications of ICT. The First World Conference on CALL was held at the University of Melbourne, Australia, in 1998. The Second World Conference on CALL took place in Banff, Canada, in 2003. The 2008 World CALL conference will take place in Japan.

World Wide Web: Usually referred to simply as the Web. This is the most powerful and fastest growing Internet service. The World Wide Web was the brainchild of Tim Berners-Lee, who in 1989 invented the HTML coding language that is the basis of the Web. The Web became a public service in 1993. It is a huge collection of resources of information, including learning materials, which is accessed by means of a computer program known as a Browser. The World Wide Web is only part of the Internet, but many people treat both terms as synonyms.

Worldwide Web Consortium (W3C): An international non-profit organization which acts as a resource centre for the World Wide Web and is active in setting technical standards. The current Director of W3C is Tim Berners-Lee, the inventor of the Web.

Worm: A computer worm is a self-replicating hostile computer program, similar to a computer Virus. A virus attaches itself to and becomes part of another program, but a worm is self-contained and does not need to be part of another program to propagate itself. Worms can cause considerable damage to computers.

WORM: Acronym for Write Once Read Many. Now a rather dated term, originally applied to a type of Optical Disc on which information could be written just once and could not be amended or erased.

Write Protect: To protect a Storage Device, File or Folder so that its contents cannot normally be altered or erased. This may be done physically, e.g. by moving a notch on a floppy disc's casing, or more commonly these days - through software that designates the

device, file or folder as read-only.

WYSIWYG: Acronym for What You See Is What You Get, dating back to the pre-Windows and preMac period, when what you saw on the screen, e.g. in a Word document, was not necessarily what appeared on your Printer - something we now take for granted.

XML: Abbreviation for eXtensible Markup Language. XML is a specification emanating from the World Wide Web Consortium (W3C) that allows Web designers to create their own language for displaying documents on the Web. XML is an extension to the standard language for creating Web pages, HTML, and makes it possible to create websites containing more complex interactivity.

Yahoo: A popular Search Engine.

Y2K: Millennium Bug.

YouTube: A website to which you can upload your own video clips and view video clips uploaded by others

Zip Disc: A portable type of disc used to store around 100Mb of data. Zip discs have become obsolete since the arrival of smaller and more convenient storage devices with much greater storage capacity, e.g. the increasingly popular Flash Drive or Memory Stick.

Zip Drive: A type of disc drive that accepts portable zip discs. Zip drives themselves are also portable and can be connected to almost any computer.

Zip: Used as a verb to describe the process of compacting files or programs in order to cut down the amount of storage space they require by compressing them into one tightly-packed file and thus to make it easier for them to be transported on floppy discs or transmitted electronically to other locations, e.g. via the Internet. Proprietary programs, such as WinZip or WinRAR, can be used to zip data and files.

Abbreviations in computer or ICT domain

There are number of abbreviations in computer or ICT domain. Some useful and important abbreviations are following:

Abbreviation	Full Form
IBM	International Business Machine

IC	Integrated Circuit
IDN	Integrated Digital Networks
IP	Internet Protocol
IrDA	Infrared Data Association
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
JPEG	Joint Photographic Experts Group
JRE	Java Runtime Engine
JSP	Java Server Pages
KB	Kilo Bytes
KHz	Kilo Hertz
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LPM	Line Per Minute
LSI	Large Scale Integration
MAN	Metropolitan Area Network
MAR	Memory Address Register
MB	Mega Bytes
MBR	Memory Buffer Register
MHz	Mega Hertz
MIDI	Musical Instrument Digital Interface
MIPS	Millions of Instructions Per Second
MNP	Microcom Network Protocol
MPEG	Moving Pictures Experts Group
MS-DOS	MicroSoft Disk Operating System
MVT	Multiprogramming with Variable Tasks
NIC	Network Interface Card
NICNET	National Informatics Center Network
NOS	Network Operating System
OCR	Optical Character Recognition
OMR	Optical Mark Reader
OS	Operating System
OSI	Open System Interconnection

OSS	Open Source Software
PAN	Personal Area Network
PC	Personal Computer
PDF	Portable Document Format
PDL	Program Design Language
PDP	Program Data Processor
PIP	Peripheral Interchange Program
PROM	Programmable Read-Only Memory
QoS	Quality of Service
RAM	Random Access Memory
ROM	Read Only Memory
SDLC	Software Development Life Cycle
SEQUEL	Structured English QUery Language
SGML	Syntax for Generalized Markup Language
SIMM	Single In-line Memory Module
SNA	Systems Network Architecture
SNOBOL	StriNg Oriented and symBolic Language
SQL	Structured Query Language
SRAM	Static RAM
SSI	Small Scale Integration
SSD	Solid State Drive
TB	Tera Bytes
TCP	Transport Control Protocol
TDM	Time Division Multiplexing
UDP	User Datagram Protocol
ULSI	Ultra Large Scale Integration
UPC	Universal Product Code
URL	Uniform Resource Locator
USB	Universal Serial Bus
UTF	Unicode Transformation Format
VAN	Value Added Network
VCR	Video Cassette Recorder
VDT	Video Display Terminal
VDU	Visual Display Unit
VGA	Video Graphics Array
VLE	Virtual Learning Environment
VOD	Video-On-Demand
VoIP	Voice over Internet Protocol
VSAT	Very Small Aperture Terminal

WAN	Wide Area Network
WAP	Wireless Application Protocol
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network
WLL	Wireless Local Loop
WORM	Write Once Read Many
WWW	World Wide Web
XHTML	eXtensible HyperText Markup Language
XML	eXtensible Markup Language
X.400	Electronic Mail Protocol
X.500	Directory Server Protocol

The abbreviations and terminologies are all correct. If you find any human error, or wrong abbreviations, please inform us through email.

Digital Initiatives in Higher Education

Digital revolution is bringing in sweeping changes in the Higher Education landscape. Every institute is taking various initiatives in promoting digital education.

The technology of online education and all the digital initiatives have the possibility to revolutionize higher education scenario in the near future. The use of technology through online education in higher education also becomes imperative due to the following factors:

- a) **Affordable:** Online education is cheaper than formal education without compromising on quality, thanks to low infrastructure costs and large learner base.
- b) **High Quality:** Online Education is directly delivered by the best teachers, assuring high quality of instruction.
- c) **Inclusive:** Online Education addresses the rural-urban divide which is manifested by the fact that at present India has 4.5% graduates in rural areas as against 17% in urban areas. For females, the disparity is starker: 2.2% female graduates in rural areas, as against 13% female graduates in the urban areas.
- d) **Employability:** By a flexible curriculum that is in line with the current market requirements, the online education can enhance the employability quotient in the youth.

- e) **Uses internet:** The penetration of IT infrastructure is expected to increase the internet users from 40.9 Cr in 2016 to 73.5 Cr by 2021. This will enhance access to online courses to the youth.
- f) **Smart Phones:** Increasing penetration of smart phones, which is expected to increase to more than 60 Cr (2021), would further facilitate the use of the online courses using the telecom spectrum.
- g) **Higher spend:** The households spend on higher education is going to increase in future, affording opportunity for the hitherto unreached population to the portals of higher education.
- h) **Retraining the workforce:** The pressing need of the employment sector for re-training and career upgradation as per the needs of the market is best served by online education leading to Life-long learning.
- i) **Skilling the unskilled:** The Skill India Mission would certainly require online courses for reaching out to the large number of unskilled or semi-skilled population to help them to upgrade their skills.

The education through digital mission holds promise since it is accessible to everyone, it is affordable, it can overcome the shortage of quality faculty and it can enhance the enrolment in higher education system. The digital learning platforms provide opportunities for lifelong learning.

SWAYAM: The 'Study Webs of Active Learning for Young Aspiring Minds' (SWAYAM) is an integrated platform for offering online courses and covering school (9th to 12th) to Post Graduate Level.

Read Further – Study Notes on Swayam

SWAYAM Prabha: SWAYAM Prabha is an initiative to provide 32 High Quality Educational Channels through DTH (Direct to Home) across the length and breadth of the country on 24X7 basis. It has curriculum-based course content covering diverse disciplines. This is primarily aimed at making quality learning resources accessible to remote areas where internet availability is still a challenge.

Read Further – Study Notes on Swayam Prabha

National Digital Library (NDL): The National Digital Library of India (NDL) is a project to develop a framework of virtual repository of learning resources with a single-window search facility. There are more than 3 crore digital resources available through the NDL. The contents cover almost all major domains of education and all major levels of

learners including life-long learners. More than 50 lakh students have registered themselves in the NDL, with about 20 lakhs active users. The NDL is available through a mobile app too. It may be accessed on ndl.gov.in.

Spoken Tutorial: They are 10-minute long, audio-video tutorial, on open source software, to improve employment potential of students. It is created for self-learning, audio dubbed into all 22 languages and with the availability of online version. The languages are C, C++, Java, PHP, Python, PERL, Scilab, OpenFOAM, OpenModelica, DWSIM, LibreO and many more. The Spoken Tutorial courses are effectively designed to train a novice user, without the support of a physical teacher.

Free and Open Source Software for Education (FOSSEE): FOSSEE is a project promoting the use of open source software in educational institutions (<http://fossee.in>). It does through instructional material, such as spoken tutorials, documentation, such as textbook companions, awareness programmes, such as conferences, training workshops, and Internships. Textbook Companion (TBC) is a collection of code for solved examples of standard textbooks. About 2,000 college students and teachers have participated in this activity & close to 1,000 TBCs have been created in Scilab and made them available for free download.

Virtual Lab: The Virtual Labs Project is to develop a fully interactive simulation environment to perform experiments, collect data, and answer questions to assess the understanding of the knowledge acquired. In order to achieve the objectives of such an ambitious project, it is essential to develop virtual laboratories with state-of-the-art computer simulation technology to create real world environments and problem handling capabilities. There are about 225 such labs operational, with more than 1800 experiments and benefitted more than 15 lakhs students.

E-Yantra: e-Yantra is a project for enabling effective education across engineering colleges in India on embedded systems and Robotics. The training for teachers and students is imparted through workshops where participants are taught basics of embedded systems and programming. More than 275 colleges across India have benefited with this initiative. All the projects and code are available on the e-Yantra website www.e-yantra.org as open source content.

ShodhGanga: Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations set-up by the INFLIBNET Centre. The Shodhganga is set-up using an open source digital repository software called DSpace developed by MIT (Massachusetts Institute of Technology) in partnership between Hewlett- Packard (HP). Shodhganga provides a platform for research scholars to deposit their Ph.D. theses and make it available to the entire scholarly community in open access. The repository has the ability to capture, index, store, disseminate and preserve ETDs (Electronic Theses and Dissertations) submitted by the researchers.

Shodhgangotri: Under the initiative called “ShodhGangotri”, research scholars / research supervisors in universities are requested to deposit electronic version of approved synopsis submitted by research scholars to the universities for registering themselves for the Ph.D programme. Now it is expanded to MRPs/PDFs/ Emeritus Fellowship etc. The repository on one hand, would reveal the trends and directions of research being conducted in Indian universities, on the other hand it would avoid duplication of research.

e-Shodh Sindhu: More than 15,000 international electronic journals and e-books are made available to all the higher educational institutions through the e shodh Sindhu initiative. This allows access to be best education resources in the world using digital mode. The INFLIBNET, Gandhinagar, Gujarat is implementing the Scheme.

e-Vidwan: It is a database of experts and National Researcher’s Network that is initiated by INFLIBNET.

The objectives of **e-VIDWAN** is to:

- i) collect academic and research profiles of scientists, faculty and research scientists working in leading academic and R&D organizations in India and abroad;
- ii) quickly and conveniently provide information about experts to peers, prospective collaborators, funding agencies, policy makers and research scholars in the country;
- iii) establish communication directly with the experts who possess the expertise needed by research scholars;
- iv) identify peer reviewers for review of articles and research proposals; and
- v) create information exchanges and networking opportunities among scientist.

The database can be used for selection of panels of experts for various committees and taskforces established by the Ministries / Govt. establishments for monitoring and evaluation purposes.

Further, the availability of single point expert database will help the policy makers and funding agencies in decision-making and policy intervention.

Talk to a Teacher:

Talk to a Teacher developed by IIT Bombay, is an initiative of the National Mission on Education through ICT, funded by MHRD to provide free access to a few selected graduate and postgraduate courses, taught at IIT Bombay by distinguished faculty

members and scholars at large. It uses A-View collaboration tool developed by Amrita University for providing virtual classrooms to the faculty across the country.

Campus Connectivity

Establishment of 1 GBPS Connectivity to universities and 20 512 Kbps broadband connectivity to colleges has been provisioned under NMEICT. A total of 600 Universities have been connected through 1 Gbps Optical Fibre; 22026 Colleges have so far been connected with 10 Mbps bandwidth. On the lines of 'Digital India' initiative of the PMO, the MHRD has now decided that the campuses of Universities, (having 1 Gbps bandwidth) shall be made WiFi enabled campus. Already all the IITs, IIMs, and NITs have established WiFi campuses. The process of laying the optical fibre and provision of the WiFi in Central Universities is currently underway.

National Academic Depository (NAD) is an initiative of Ministry of Human Resources Development, Govt. of India (MHRD) to facilitate digital issuance, storage, access and verification of Academic Awards issued by Academic Institutions. NAD is a Unique, Innovative and Progressive initiative under "Digital India" theme towards achieving Digital enablement of the Education Records. NAD aspires to make the vision of Digital Academic Certificates for every Indian a reality. This touches the lives of Indian youth and empowers them with Digital, Online, Trusted, Verifiable Certificates which are accessible in a secure manner at all times. NAD promises to do away with difficulties / inefficiencies of collecting, maintaining, and presenting physical paper certificates.

E-Kalpa: It is another MHRD/ NMEICT initiative for creating Digital-Learning Environment for Design in India. It has successfully achieved the following project objectives, on completion of its phase I:

1. Digital online content for learning Design with e-Learning programs on Design
2. Digital Design Resource Database including the craft sector
3. Social networking for Higher Learning with collaborative Learning Space for Design
4. Design inputs for products of National Mission in Education through ICT.

Digital Initiatives other than Higher Education

e-Pathshala:

The digital India campaign has promoted extensive use of ICTs in the teaching learning process. The e-Pathshala, a joint initiative of Ministry of Human Resource Development (MHRD), Govt. of India and National Council of Educational Research and Training

(NCERT) has been developed for showcasing and disseminating all educational e-resources including textbooks, audio, video, periodicals, and a variety of other print and non-print materials for Students, Teachers, Parents, researchers and educators.

It provides access to digital textbooks for all classes, graded learning materials and enables participation in exhibitions, contests, festivals, workshops, etc.

e-Basta:

e-Basta is a framework to make schoolbooks accessible in digital form as e-books to be read and used on tablets and laptops. The main idea is to bring various publishers (free as well as commercial) and schools together on one platform.

Besides the portal, a back-end framework to facilitate the organization and easy management of such resources has also been made, along with the web-based applications that can be installed on tablets for navigating the framework.

Sugamya Pustakalaya:

Sugamya Pustakalaya is an online library that contains books accessible to the blind, people with low vision or to persons with any other print disability.

The library houses publications across diverse subjects and languages and multiple accessible formats. It has been created by Department of Empowerment of Persons with Disabilities (Divyangjan), Ministry of Social Justice and Empowerment in collaboration with member organizations of Daisy Forum of India (DFI) and powered by TCS Access.

Diksha:

National Teacher Platform (NTP) branded as "Diksha" is an initiative of the Ministry of Human Resource Development, Government of India. It is a state-of-the-art platform built to host Open Educational Resources (OER) and tools for Teachers in Schools, Teacher Educators in Teacher Education Institutes (TEIs) and Student Teachers in TEIs. It is built considering the whole teacher's life cycle - from the time student teachers enroll in TEIs to after they retire as teachers.

Saransh:

Saransh is a tool for comprehensive self-review and analysis for CBSE affiliated schools and parents. It enables them to analyse students' performance in order to take remedial measures.

Saransh brings schools, teachers and parents closer, so that they can monitor the progress of students and help them improve their performance. It is a Central Board of Secondary Education (CBSE) initiative.

ICT and Governance

ICT and Governance: According to revised syllabus, ICT and Governance is a new topic of UGC NET paper 1. Before the discussion of the topic, get familiar with the term “ICT” and “Governance”.

Information and Communication Technology (ICT):

According to UNESCO, “ICT is a scientific, technological and engineering discipline and management techniques used in handling information and application and association with social, economic and cultural matters”. World Bank defined as “ICT consists of hardware, software, networks, and media for collection, storage, processing, transmission, and presentation of information (voice, data, text, images).”

American Library Association (1983) defined information communication technology (ICT) as the application of computers and other technologies to the acquisition, organization, storage, retrieval, and dissemination of information. The computers are used to process and store data, while telecommunication technology provides information communication tools, which make it possible for users to access databases and link them with other computer networks at different locations.

Governance:

According to United Nations Development Programme (UNDP), governance is the exercise of economic, political and administrative authority to manage a country’s affairs at all levels. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences.

World Bank defined governance as the method through which power is exercised in the management of a country’s political, economic and social resources for development.

In brief, governance is the systems and processes that ensure the overall effectiveness of an entity whether a business, government or multilateral institution.

E-Governance:

World Bank defined as “E-Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile

computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.”

According to United Nations; “E-government is defined as utilizing the Internet and the world- wide-web for delivering government information and services to citizens.”

ICT + Governance = E-Governance

So, we can define, “E-government involves using information technology, and especially the Internet, to improve the delivery of government services to citizens, businesses, and other government agencies. E-government enables citizens to interact and receive services from the federal, state or local governments twenty-four hours a day, seven days a week.”

Objectives of e-Governance

The following are the objectives e-Governance:

To build an informed society – An informed society is an empowered society. Only informed people can make a responsible Government. Access to every piece of information of the Government and of public importance is one of the basic objectives of E-Governance.

To increase Government and Citizen Interaction - E-Governance aims at building a feedback framework, to get feedback from the people and to make the government aware of people's problems and to find solutions with their active involvement. To encourage citizen participation - E-governance aims to restore democracy to its true meaning by improving citizen participation in the Governing process, by improving the feedback, access to information and overall participation of the citizens in the decision making.

To bring transparency in the governing process - E-governance carries an objective to make the Governing process transparent by making all the Government data and information accessible to people. It is to make people know the decisions, and policies of the Government.

To make the Government accountable - Government is responsible and answerable for every decision taken by it. E-Governance aims to help the Government to be more accountable than now by bringing transparency and making the citizens more informed.

To reduce the cost of Governance - E-Governance also aims to reduce cost of governance by cutting down expenditure on physical delivery of information and services particularly by cutting down on stationary, which amounts to most of the government expenditure.

To reduce the reaction time of the Government – Normally due to red-tapism and other reasons, the Government takes long to reply to people's queries and problems. E-Governance aims to reduce the reaction time of the Government to the people's queries and problems.

Advantages of e-Governance

Following are the important advantages of e-Governance:

Speed: Technology makes communication speedier. Internet, Phones and Cell Phones have reduced the time taken in normal communication.

Cost Reduction: Paper-based communication needs lots of stationary, printers, computers, etc. which calls for continuous heavy expenditure. Internet and Phones make communication cheaper saving valuable money for the Government.

Transparency: Use of ICT makes governing process transparent. This is possible when every piece of information of the Government is uploaded on the internet and is available for the public to peruse. Current governing process leaves many ways to conceal the information from the people. ICT helps the information available online, eliminating all possibilities of concealing information.

Accountability: Once the governing process is made transparent the Government is automatically made accountable. Accountability is answerability of the Government to the people. It is the answerability for the deeds of the Government and accountability makes a responsible Government.

Scope of e-Governance

Governance is all about flow of information between the Government and Citizens, the Government and Businesses and the Government and Government. E- Governance covers all these relationships as follows:

- Government to Citizen (G2C)
- Citizen to Government (C2G)
- Government to Government (G2G)

- Government to Business (G2B)

Government to Citizen:

Government to Citizen relationship is the most basic aspect of E-Governance. The G2C relation includes the services provided by the Government to the Citizens. In modern times, Government deals with many aspects of the life of a citizen which include the public utility services i.e. Telecommunication, Transportation, Post, Medical facilities, Electricity, Education and some of the democratic services relating to the citizenship such as Certification, Registration, Licensing, Taxation, Passports, Aadhar Card, ID Cards etc. The relation of a citizen with the Government starts with the birth and ends with the death of the citizen. Therefore E-Governance in G2C relationship will involve facilitation of the services flowing from Government towards Citizens with the use of Information and Communications Technology (ICT). Some of the emerging areas in G2C can be listed as follows:

E-Citizenship: E-Citizenship will include the implementation of ICT for facilitation of Government Services relating to citizenship of an individual. It may involve online transactions relating to issue and renewal of documents like Ration Cards, Passports, Election Cards, Identity Cards, etc. It is required for the Government to create a virtual identity for every citizen so as to enable them to access the Government services online. For the same, Government would need to create a Citizen Database which is a huge task.

E-Registration - E-Registration will cover the online registration of various contracts. Many of these contracts and transactions require registration for giving it legality and enforceability. Such registration may also be made ICT enabled. E-registration will help to reduce a significant amount of paperwork.

E-Transportation - E-Transportation includes ICT enabled services of Government, relating to Transport by Road, Rail, Water or Air. This may involve online –

1. booking and cancellation of tickets,
2. knowing status of vehicles, railways, boats and flights,
3. issue and renewal of driving licences,
4. registration and renewal of vehicles,
5. transfer of vehicles,
6. payment of the fees of licences and-
7. payment of fees and taxes for vehicle registration.

E-Health: E-Health services includes ICT enabled health services of the Government. Under this, interconnection of all hospitals may take place. Patient database and local pharmacy database may also be created.

E-Education: E-Education would cover the implementation of ICT in education. Distant as well as classroom education needs facilitation through the use of ICT. For instance, use of internet reduces the communication time required in distance education. Internet may also help in conducting online classes.**E-Help:** E-Help refers to the facilitation of disaster and crisis management using ICT. It includes the use of technologies like internet and SMS for the purpose of reducing the response time of the Government agencies to the disasters. Online information relating to disasters, warnings and calls for help can assist the Government and the NGOs to coordinate their work and speed up the rescue work.

E-Taxation: E-Taxation will facilitate the taxing process by implementing ICT in the taxing process. Online tax due alerts and online payment of taxes would help transact faster.

Citizen to Government

Citizen to Government relationship will include the communication of citizens with the Government arising in the Democratic process like voting, campaigning, feedback, etc.

E-Democracy: The true concept of Democracy includes the participation of citizens in the democratic and governing process. Today due to the increased population the active participation of the citizens in governing process is not possible. The ICT can help to enable the true democratic process including voting, public opinion, feedback and Government accountability.

E-Feedback: E-Feedback includes the use of ICT for the purpose of giving feedback to the Government. Lobbying is pursuing the Government to take a certain decision. Use of ICT can enable online feedback to the Government, online debates as to the Government services.

Government to Government (G2G)

G2G relationship includes the relationship between Central and State Government and also the relationship between two or more Government departments.

E-Administration: E-administration would include the implementation of ICT in the functioning of the Government, internally and externally. Implementation of ICT can reduce the communication time between the Government Departments and Governments. It can substantially reduce paperwork if properly used. E-administration will also bring speed and transparency to the administration of Government Departments.

E-Police: The concept of E- Police is little different from Cyber-Police. Cyber Police require technology experts to curb the electronic/cybercrimes. E-police refers to the use

of ICT for the purpose of facilitating the work of the Police department in investigation and administration. The concept of E-police includes databases of Police Officers, their performances, Criminal databases – wanted as well as in custody, the trends in crimes and much more. ICT can help reduce the response time of the Police department and also reduce cost by reducing paperwork.

E-Courts: The concept of E-Court includes the ICT enablement of the judicial process. Technology may help distant hearing, online summons and warrants and online publication of judgment and decrees.

Government to Business (G2B)

E-Taxation: Corporate sector pays many taxes, duties and dues to the Government. Payment of these taxes and duties will be made easier by E-Taxation. Online taxing and online payment of taxes can help reduce cost and time required for physical submission of taxes. ICT can also help cross check the frauds and deficiencies in payment, further bringing accuracy and revenue to the Government.

E-Licensing: Companies have to acquire various licenses from the Government, similarly the companies have to acquire various registrations. ICT enablement of the licensing and registration can reduce time and cost.

E-Tendering: E-Tendering will include the facilities of online tendering and procurement. It alerts to new opportunities of business with the Government, and also online submission of tenders and online allotment of work. It will reduce time and cost involved in the physical tendering system.

Emerging Areas for e-Governance in India

Agriculture Allied Services: To provide real time information to the farmers on crop prices, new technique, use of fertilizers, post-harvest processing, disbursement of cash and monitoring of agricultural credit. Farmers can use a network of tele-centres to co-ordinate their planning.

Education

Literacy is the key challenge which affects major problems of the society and only e-governance is one of the probable ways, which can solve the problem. As rural India suffers from inadequate education services, e-governance can play an important role in the delivery of education to rural areas. Using technology, students in these villages can be taught by teachers in urban areas. With this in mind, Government of India has taken significant effort by launching of 'EDUSAT' the first Indian satellite built exclusively for serving the educational sector.

Health and Sanitation

E-governance can be used as a tool for comprehensive management of hospitals and health centres in the villages to ensure proper delivery of health-related services in rural India. ICT are being used in developing countries to facilitate remote consultation diagnosis and treatment. The immunization process can also be covered by e-governance so that the percentage child vaccination can be improved to a great extent. An infant child can be registered, and as a result of that his/her vaccination detail can be uploaded to a centralized database of portal. An SMS service can be implemented to remind the parents about the scheduled vaccination day for their child. It will also help not only in the process of immunization but also in monitoring the vaccination programmes in various states.

ICT in energy conservation

Information and Communication Technologies can play a crucial role in achieving an energy- efficient and low-carbon economy. The European Commission has put ICT at the forefront of an energy revolution. Using ICT in a smart way could help to reduce energy consumption in buildings by 17%, transport and logistics by 27%, and save 15% in total carbon emissions by 2020. ICT can improve energy efficiency in several ways.