

WDD 101 / CSPD 101 / EOM 101

**ICT Resources & Technology Enabled
Learning**

Skill Enhancement Course (SEC)

School of Vocational Studies



उत्तराखण्ड मुक्त विश्वविद्यालय

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UNIT- 1

FUNDAMENTALS OF DIGITAL COMPUTER- I

1.1	INTRODUCTION
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1.3	REPRESENTATION OF DATA IN COMPUTERS
1.4	COMPONENTS OF COMPUTER
1.5	EVOLUTION OF COMPUTERS
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1.1 INTRODUCTION

This unit presents a broad survey of concepts and terminology related to today's digital computers. Here, the idea of computer literacy is introduced. A computer is also a tool intended to assist the user in accomplishing information-based tasks ranging from locating and acquiring data/information to processing it and to presenting or transmitting it as output. Besides, it allows the user to browse the web pages, read a book, play a video game, watch a movie, etc.

When you look at a desktop computer, it comprises a monitor, keyboard, mouse, and a vertical or horizontal box called a system unit. It is acceptable to refer to all of these components as a computer. Technically, the systems unit houses the actual 'computer' or programmable machine (hardware, firmware and, software), which executes (carries out) or

responds to a sequence of program instructions. A computer system then is a collective term for a computer (housed within the system unit), as well as these other components that are attached to it to allow the user to input data and view output using different devices. Some of these components include a monitor, keyboard, mouse, printer, disk drives, scanners, microphones, and speakers, which are also referred to as peripherals. The peripherals work together to help the user accomplish a given task effectively. It is the system unit that accepts and processes the data, and generates the results. Other peripheral devices such as the hard drive store the data and results, which can be viewed on the monitor.

The major components of a computer system include Central Processing Unit (CPU), input and output devices. The CPU comprises a set of electronic circuits kept within the system unit. The CPU is the brain of a computer system and is responsible for processing the data i.e. input from peripheral devices and output to another peripheral device. The Central Processing Unit (CPU), also known as the processor or microprocessor has components that control the operating system and other software installed on the computer. The CPU also sends commands and data to the peripherals attached to the computer, such as the monitor or printer.

Therefore, the speed (how fast the electrons move around the chip) at which the CPU executes its tasks (or commands) determines how quickly you can view or hear the output from the command such as printing a page or allowing you to view a letter on the monitor. This speed is called 'clock speed' and is measured in megahertz (MHz). A computer system that responds to commands quicker means that it's clock speed is working faster to execute these commands. Different CPUs use different silicon chips to execute the commands and process data. Different types of chips have different clock speeds based on the technology that was used to create them.

The peripheral devices mentioned above are collectively called hardware devices, since they can be physically attached to the computer. However, computer systems also include software, or programs that are integral in the functioning of some of these peripheral devices and are necessary to make the computer operate. Every computer system requires an operating system. An operating system is a program that establishes communications with the various peripherals and acts as a bridge to other application-specific software programs. An operating system is like the command centre of the ship. It makes all of the decisions about how the computer will function and work with others.

1.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define the term and its components.
- Understand the Input devices and output devices used.

- Define Computer Generations and key applications of computers.
- Understand the concept of storing data into computers.
- Know about computer memory e.g., primary memory and secondary memory.

1.3 REPRESENTATION OF DATA IN COMPUTERS

A computer is an electronic processing device, which accepts inputs, processes the input data, and generates the output. In other words, a computer is an electronic device, operating under the control of instructions (software) stored in its own memory unit, that can accept data (input), manipulate data (process), and produce information (output) from the processing. COMPUTER stands for- Common Operating Machine Particularly Used for Training Education and Research.

The minimum requirements for a functional computer system include; a keyboard, a CPU and memory, and a monitor. The data is usually entered via the keyboard and the information is usually presented through a screen. However, information can also be presented through speakers or any other output devices e.g., screen projector, printer.

The way components inside a computer fit together helps describe how the computer works. Data comes in through an Input Device, and is sent to the CPU by the memory. CPU processes the data based on the input data and the program is installed in the computer memory. When the CPU has finished processing the data, it is presented through the output device as information. The information can be stored in the computer memory or presented through an Output Device.

Data and instructions cannot be entered and processed directly into computers using human language. Any type of data- numbers, letters, special symbols, sound or pictures must first be converted into machine-readable form i.e. binary form. Due to this reason, it is important to understand how a computer together with its peripheral devices handles data in its electronic circuits, on magnetic media, and in optical devices. Electronic components, such as microprocessor, are made up of millions of electronic circuits. The availability of high voltage(on) in these circuits is interpreted as '1' while a low voltage (off) is interpreted as '0'. This concept can be compared to switching on and off an electric circuit. When the switch is closed the high voltage in the circuit causes the bulb to light ('1' state). On the other hand, when the switch is open, the bulb goes off ('0' state). This forms a basis for describing data representation in digital computers using the binary number system.

It has proved difficult to develop devices that can understand natural language directly due to the complexity of natural languages. However, it is easier to construct electric circuits based on the binary or ON and OFF logic. All forms of data can be represented in a binary system

format. Other reasons for the use of binary are that digital devices are more reliable, small, and use less energy as compared to analog devices.

Bits, bytes, nibble, and word

The terms bits, bytes, nibble, and word are used widely in reference to computer memory and data size.

Bits: is the basic unit of data or information in digital computers, expressed in binary forms 0 or 1.

Byte: a group of bits (8 bits) used to represent a character. A byte is considered as the basic unit of measuring memory size in computer.

A nibble: is half a byte, which is usually a grouping of 4 bytes.

Word: two or more bits make a word. The term 'word length' is used as the measure of the number of bits in each word. For example, a word can have a length of 16 bits, 32 bits, 64 bits, etc.

Computers not only process numbers, letters and special symbols but also complex types of data such as sound and pictures. However, these complex types of data take a lot of memory and processor time when coded in a binary form. This limitation necessitates the need to develop better ways of handling long streams of binary digits. Higher number systems are used in computing to reduce these streams of binary digits into manageable form. This helps to improve the processing speed and optimize memory usage.

Number systems and their representation-

A number system is a set of symbols used to represent values derived from a common base or radix. As far as computers are concerned, number systems can be classified into two major categories:

- decimal number system
- binary number system

While the other number systems include: octal number system and hexadecimal number system.

1.4 COMPONENTS OF COMPUTER

To perform computer functionalities, we need some hardware and software. In a general way computer is an electronic device which perform particular tasks. It takes input and processes



it to produce an output. Primarily there are three main components of a digital computer- Input Unit, Processing Unit and, Output Unit.

Input Unit-

It takes different types of input data from various input devices like-keyboard, mouse, light pen, scanner, MICR, Bar Code Reader, etc. Whenever you want to instruct anything to a computer, input device (s) is (are) needed. If you want to write an application on a computer, you need an input device called “KEYBOARD”.

List of input devices-

- Keyboard
- Mouse
- Joystick
- Light pen
- Trackball
- Scanner
- Graphic Tablet (touch screen)
- Microphone
- Magnetic Ink Character Reader (MICR)
- Optical Character Reader (OCR)
- Bar Code Reader
- Optical Mark Reader (OMR)



Keyboard



Mouse



Joy Stick



Microphone



MICR



Scanner



OMR

Details about some frequently used input devices-

Keyboard-

Keyboard is a frequently used input device. A keyboard is just like a traditional typewriter, although keyboard has some additional keys used for performing additional functions.



The above keyboard has 104 keys. Most of the keyboards are common. Generally, keyboards can be categorized into 6 parts as follows:

Typing Keys-

These keys consist of key letters (A-Z) and digit keys (0-9) which are the same as typewriters.

Numeric Keypad-

Some keyboards have this numeric keypad. Numeric keypad is placed into the right side of the keyboard just shown in the above keypad.

Function Keys-

At the top of the keyboard, 12 function keys are present where each key has a unique task. The function of these keys varies application to application.

Control Keys-

It includes Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt) and Escape(Esc) key. Each key has some special function or worked into combination with some other keys.

Special Purpose Keys-

Keyboard also contains some special purpose keys such as Enter, Shift, CapsLock, NumLock, Spacebar, Tab, and Print Screen.

Arrow Keys-

It consists of four directional arrow keys named as-left arrow, right arrow, up arrow and down arrow.

Mouse-

This is a commonly used pointing device. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text or any data into the computer. Douglas Engelbart called the father of mouse and invented it in 1963. There are basically three kinds of mouse- Mechanical Mouse, Optical Mouse, and Cordless Mouse.

A mouse contains the following functional buttons-

- Click (Left Click)
- Right Click
- Scrolling (Middle Button)
- Double Click

Scanner-

A scanner is an input device just like a photocopy machine. It is used when a paper has some information and it is to be transferred to the computer for further manipulation. The scanner captures images from the source, which are then converted into a digital form that can be stored on the disk.

Processing Unit-

The Processing unit is also called a Central Processing Unit (CPU). CPU is the brain of your computer. It performs all types of data processing operations and stores data & intermediate results for a while (during processing). It also controls the operation of all parts of the computer system. In general terms, CPU can be understood as the following-

- Control Unit (CU) - It controls the various component of a computer.
- Arithmetic and Logic Unit (ALU) - This subunit of the CPU performs all the arithmetic and logical operations such as- addition, subtraction, multiplication, division, and comparison.

Note- Apart from the processing unit, memory unit is an indispensable part to the smooth running of a program. Whenever you need to store information in a computer, you need memory. Computer memory is basically sub divided into two broader categories as-

- (i) Primary Memory (also known as Main Memory).
- (ii) Secondary Memory (also known as Storage / Permanent Memory).

Note-We will have a detail discussion about memory unit further in this book.

Output Unit-

The processed data is called output. After processing, either the results are stored in the memory or sent to the output unit. Some examples of different output devices are- CRT (Cathode Ray Tube) monitor, LCD (Liquid Crystal Display) monitor, LED (Light Emitting Diode) monitor, printer, speaker, screen projector, plotter, etc.

Monitor-

A monitor is a commonly used output device which displays information in a similar way to that of a television screen. Generally, the size of a monitor is 19-inch, 20 inch and 21 inches. Broadly speaking, there are three different types of monitors-

Cathode Ray Tube (CRT)

Liquid Crystal Display (LCD)

Light Emitting Diode (LED)

Printer-

A printer is a hard copy output device i.e. it provides the output in a hard copy/printed form. There are two types of computers- Impact Printer and Non- impact printers.

Impact Printers– refers to all those printers whose printing heads touches the paper, for e.g., dot matrix printer.

Non- Impact Printer– refers to all those printers whose printing heads do not touch the paper, for e.g., laser and inkjet printer.

1.5 EVOLUTION OF COMPUTER

Today most of the jobs mainly depend on either the creation or collection and distribution of information. This topic addresses the different advancements in computer technology and the various types of computers and their critical components. As each new computer generation improves on its previous generation, there has been a corresponding reduction in size (or miniaturization) of computer circuitry. In contrast to this miniaturization, the speed, power, and memory of computers have proportionally increased. Although this topic will describe the major developments of each computer generation, it is more important to consider how technology has influenced the development of current computer systems. The detailed description of computer evolution is discussed in the next title.

1.6 GENERATION OF COMPUTER

- First Generation (Year 1946 - 1959)
- Second Generation (Year 1959 - 1965)
- Third Generation (Year 1965 - 1971)
- Fourth Generation (Year 1971 - 1980)
- Fifth Generation (Year 1980- Onwards)

First Generation (1946 - 1959)-

First-generation computers were vacuum tube-based computers popular in the period 1946-1959. These vacuum-based computers were expensive, extremely large, and less cost-effective as they consumed a lot of electricity. The language used for storing and processing data was machine language. Some of the first-generation computers are:

Electronic Numerical Integrator and Calculator (ENIAC) built at the University of Pennsylvania in the year 1946 by John Eckert and John Mauchly. Electronic Discrete Variable Automatic Computer (EDVAC) developed in 1950 at Cambridge University.

UNIVAC-1 developed in 1951. The following drawbacks were there in first-generation computers as-

- They were extremely large.
- Operational speed was very slow.
- Electric consumption was very large.
- They have no operating system.
- The programming capability was very low.

Second Generation (1959 - 1965)-

The computers from 1959- 1965 were transistor-based second generation computers. In this generation, vacuum tubes were replaced by more durable transistors. Transistors are more compact than vacuum tubes as they are made up of semiconductors. Some of the computers of the second generations are:

IBM 1620- Its size was smaller as compared to the first-generation computers, used mostly for scientific purposes.

IBM1401- used for business applications.

CDC3600- used for scientific purposes.

The salient features of this generation are-

- They were smaller in size than the first generation computers.
- Operational speed relatively faster and more reliable than first-generation computers.
- Electricity consumption was relatively lesser than first-generation computers.
- They had higher capacity internal storage.

Third Generation (Year 1965 - 1971)-

The third- generation computers from 1965 to 1971 were Integrated Circuit (IC) based. These ICs are more compact than a transistor and were called chips. Single ICs has many transistors, resistors and capacitors, placed on a single thin of silicon. So, the computer built of such components became smaller. Some of the computers developed during this period were-

IBM360- developed by IBM in the year 1964.

PDP8- developed by DEC in the year 1965.

The salient features of this generation are-

- Relatively small in size.
- Relatively low cost.
- Operating system is used.

- More reliable and high operational speed.
- Large memory capacity.

Fourth Generation (1971 - 1980)-

The computers from the period 1971-1980 were Very Large Scale Integrated (VLSI) microprocessor-based fourth generation computers. VLSI circuits were used in these computers. VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of the fourth generation. As a result, fourth-generation computers became more powerful, compact, reliable, and affordable giving rise to personal computer (PC) revolution. In this generation time sharing, real-time networks, and distributed operating systems were used. All the high-level programming languages like C, C++, DBASE etc., were developed during this generation.

The salient features of this generation are-

- They have a very high speed.
- Low costs in comparison to the preceding generations.
- Smaller in size.
- Reliability is very high.
- Hardware failure is very low.
- Very low heat generation.

Fifth Generation (1980- Onwards)-

The fifth generation of computers developed 1980 onwards were Ultra Large Scale Integrated (ULSI) microprocessor-based. In this generation, the VLSI technology was replaced by more advanced ULSI technology. ULSI is a set of ten million electronic components into a single chip. This technology is based on parallel processing with hardware and software support. A key advancement of this generation is machine learning/artificial learning.

The salient features of this generation are-

- Working based on artificial intelligence or machine learning.
- Working based on image and graphics recognition.
- Highly efficient in solving highly complex problems including decision making, logical reasoning, and many more.

1.7 CLASSIFICATION OF COMPUTER

Computers of this age can be broadly categorized in the following two ways-

- Based on the size of memory
- Based on speed.

Based on the size of the memory, computers can be further classified into-

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

Micro Computer-

The speed of a micro computer is very low with similar low capacity of storage. Its CPU is a microprocessor. The first microcomputers were built of 8-bit microprocessor chips. The most common microcomputer is a personal computer (PC). The PC supports many input and output devices. An improvement of the 8-bit chip is 16-bit and 32-bit chips. Examples of microcomputers are- IBM PC, PC-AT, etc.

Mini Computer-

This is designed to support more than one user at a time. It possesses a large storage capacity and operates at a high speed than a microcomputer. The mini computer is used in a multi-users system in which various users can work at the same time. This type of computer is generally used for processing large volumes of data in an organization. They are also used as servers in Local Area Networks (LAN).

Mainframe Computer-

32-bit computers are generally called mainframe computers. They operate at a very high speed, have very large storage capacity, and can handle the workload of many users simultaneously. They are generally used in centralized databases. The mainframe computers are also used as controlling nodes in Wide Area Network (WAN). Examples of mainframe computers are- DEC, ICL and IBM 3000 series.

Super Computer-

A supercomputer is the fastest and most expensive. The processing speed of this type of computer is very high, so they are relatively costly. They also have multiprocessing techniques. One of the ways in which supercomputers are built is by interconnecting hundreds of microprocessors. Supercomputers are mainly used for weather forecasting, biomedical research, remote sensing, aircraft design, and other advanced areas of science and technology. Some examples of supercomputers are- CRAY YMP, CRAY2, NEC SX3, CRAY XMP, and PARAM from India.

1.8 COMPUTER MEMORY

Note: More details about Computer Memory are available in the next Unit.

[A] Primary Memory

Computer memory is used to store information (data and instructions) in a digital computer. A memory is divided into several small parts called memory cells. Each memory cell or location has a unique address in the form of machine language (0/1). It is useful to know how to store information on a computer because this will allow us to ascertain about the amount of space that will be required to store a data set which in turn will allow us to determine what software or hardware, we will need to be able to work with a data set and to decide upon an appropriate storage format. The computer memory is divided into main and auxiliary memory. Main memory also called primary memory and secondary memory also called storage memory. Main memory holds instructions and data when a program is in execution, while auxiliary or secondary memory holds data and programs not currently in execution and acts as a storage medium.

Primary memory holds instructions and data currently being processed by the CPU- the intermediate results produced during the execution of the process. The instructions and data remain in primary memory which can be accessed by the CPU directly and quickly.

Functions of Primary Memory

- Holding data and instructions for the task assigned by the input device before processing.
- Holding intermediate results while processing.
- Holding data and information after processing unless they are transferred to the output unit.
- Holding programs and instructions from the secondary storage device.
- Holding system programs like an operating system.

Types of Primary Memory-

- Random Access Memory (RAM)
- Read-Only Memory (ROM)

Random Access Memory (RAM)-

It is a volatile or temporary memory. Its contents get lost once the power supply is switched off. It is also called read/write (R/W) memory. It allows CPU to read as well as write data and instructions over it. It temporarily holds software, programs /instructions before and after processing of the data. RAM is used during the execution of instructions. RAM is considered 'random access' because you can access any memory cell directly. RAM is made up of semiconductor material; therefore, it is also called semiconductor memory, just like processors and ROM types of chips. In comparison to other memory devices (storage memory), RAM is much faster to read and write instructions, and data. RAM is also named

direct access memory because the operating system, application programs, and data currently in use are stored in RAM directly accessed by the CPU/processor.

The Random Access Memory is further divided into- (i) Dynamic Random Access Memory (DRAM) (ii) Static Random Access Memory (SRAM).

Dynamic Random Access Memory (DRAM)-

It makes use of a transistor and a capacitor to form a memory cell standing for a single bit of data. DRAM is not able to retain information for a longer time even if the power supply is on because it needs refreshing frequently. It is slower and less expensive than SRAM.

Static Random Access Memory (SRAM)-

In SRAM flip flops are used for retaining memory. Typically, it uses four to six transistors for each memory cell. It does not have a capacitor and hence does not require refreshing. It can store information until the power supply is “on”. It is faster and expensive in comparison to DRAM and primarily used in the processor’s cache memory.

Note- Apart from SRAM and DRAM, some other types of RAM are also available. Few are as follows:

- a) Fast Page Mode Dynamic Random Access Memory (FPM DRAM) – This memory is a bit faster in comparison to the conventional DRAM. The access time is improved for this memory as it sends row address only once for accessing the neighbouring locations in memory. Despite its name, it is still one of the slowest RAMs used today. This memory is not considered good for high-speed memory buses over 66 MHz.
- b) Extended Data Output Dynamic Random Access Memory (EDO DRAM) – It can be seen as an improved version of “FPM DRAM”, as it can retain data valid for a longer period than FPM. Due to this feature, it is known as the extended data output. It stores 265 bytes of data information into latches and these latches hold the next same amount of information. This arrangement makes it possible for programs to be executed sequentially without any delay.
- c) Synchronous Dynamic Random Access Memory (SDRAM) – SDRAM is a generic name that refers to the many dynamic random-access memories that are synchronized with the system bus. It carries data between the CPU and the memory controller hub. It uses the features called pipelining, which accepts new data before to finish previous processing data.
- d) Double Data Rate - Synchronous Dynamic Random Access Memory (DDR- SDRAM) - Double data rate SDRAM was introduced later to give an alternative to single data rate SDRAM. DDR SDRAM provides better speed than Synchronous Dynamic Random Access Memory and also consumes a lesser amount of energy. The transfer

rate of data became just double as it is capable of sending data on both rising and falling edges of the clock pulse.

- e) Double Data Rate Type2 - Synchronous Dynamic Random Access Memory (DDR2-SDRAM) – The speed of DDR2- SDRAM is just double in comparison to the DDR SDRAM because its input/output buffer frequency is doubled.
- f) Double Data Rate Type3 - Synchronous Dynamic Random Access Memory (DDR3 SDRAM)– DDR3- SDRAM is considered as an improved version of DDR2 SDRAM. It also doubles the speed of DDR2 SDRAM. Its power consumption is lesser and the rates of data transfer range from 800Mbps to 1600 Mbps.
- g) Double Data Rate Type4 - Synchronous Dynamic Random Access Memory (DDR4 SDRAM) – This RAM is a higher-speed successor to the technology used by DDR3 SDRAM. This provides better system-level reliability, capacity, performance scalability, and power efficiency in comparison to all of its previous memories. Such as- DDR3 SDRAMs.

Read-Only Memory (ROM)

It is a non-volatile memory whose contents are not lost even the electric power is off. It stores instructions for computer start-up. During the computer start-up operation, the main memory (RAM) of the computer is empty because of its volatile nature, so that the computer gets instructions from the ROM to start-up (booting) operation. The contents of ROM cannot be written or erased by the user only trained programmers and technicians can alter or write or erase the contents of ROM. ROM chips are generally designed at the time of manufacturing. ROM also performs the BIOS (Basic Input Output System) functions.

Types of Read-Only Memory

- Programmable Read-Only Memory (PROM)
 - Erasable Programmable Read-Only Memory (EPROM)
 - Electronically Erasable Read-Only Memory (EEPROM)
- a) **Programmable Read-Only Memory (PROM)** - The data stored in PROM cannot be modified and therefore it is also known as a ‘one-time programmable device’. It is made as a blank memory as a result when you want to write on a PROM chip, a ROM burner is required to write data onto a PROM chip.
 - b) **Erasable Programmable Read-Only Memory (EPROM)**- Unlike programmable ROM; erasable programmable ROM can write/modify data more than once. When ultraviolet rays of some specific wavelength fall into EPROM’s chip glass panel, the bits of memory come back to 1 and the chip enables them to write.

- c) **Electrically Erasable Read-Only Memory (EEPROM)**- Electrically Erasable Programmable ROM is as same as Erasable Programmable ROM, but the same work of erasing the stored data is performed with an electric current. EEPROM is a type of non-volatile memory and used in computers and other electronic devices. It used to store relatively small amounts of data and also allows individual bytes to be erased and reprogrammed. It stores a computer system's BIOS (Basic Input Output System). Unlike EPROM the entire chip does not have to be erased for changing some portion of it.

[B] Secondary Memory

Secondary memory is where programs and data are kept on a long-term basis. Common secondary storage devices are the hard disk and optical disks. A hard disk might have a storage capacity of one terabyte (TB). A hard disk is slow in accessing speed compared to the main memory. Secondary memory has enormous storage capacity, especially hard disk. Some of the secondary storage devices are explained below-

- a) **Hard Disk Drive (HDD)**- Hard disks are stored permanently inside their drive, which is normally installed into the computer box where you cannot see any part of it. Hard Disks can store a lot of data and are used to store most of the information on computers. The advantage of HDD is cost and capacity. The disadvantage of HDD is that they make a lot of noise, are slow, and prone to failure. They are slowly being replaced by solid-state drives (SSD).
- b) **Floppy Disk Drive (FDD)**- Floppy disks are small disks that you can pop in and out of their drive. All you can see of their drive is a slit in the computer box with a button and a light. You can put in different disks and then take them out and give them to someone so that you can transfer data between your computers. FDD's are now obsolete. They can store only about 1.44 MB, which is way too little. They are prone to damage and are now unsupported for many years.
- c) **Compact Disk (CD)**- The most popular kind of optical disk is the Compact Disc (CD). CDs can still be put into and taken out of their drive, making them good for buying programs and for transferring data nowadays. The normal CDs that you buy with programs on them are CD-ROMs. They are called so because like ROM, they are read-only. You can also get CD-Rs and CD-RWs, which are not read-only and are not erasable and erasable, respectively. However, CD-R cannot be deleted once it is written(a process known as finalizing). CDs can store around 700MB. And, because CDs store their information with variations in the shape of the disk that reflects a laser differently, they cannot be damaged as easily. However, one should still never touch the shiny surface of the CD. CDs are now being replaced by online media, and do not feature in many new computers anymore.

- d) **Digital Versatile Discs (DVD)**- DVDs are another kind of Optical disc that works identically to CDs; however, they can store much more information than CDs. DVDs can store usually about 4.3 GB, but dual-layered DVDs can store up to about 9 GB and DVD-RAM can store about the same amount. They are sometimes called Digital Video Discs because of their extensive use in video and films.
- e) **Flash memory**- Nowadays, one can get memory cards that are called flash memory or, more properly, EEPROMs. These are cards that operate just like ROM that isn't read-only, so they don't lose their information when the power is cut.
- f) **Solid State Disks (SSD)**- SSDs are based on flash memory. They are much quicker than HDDs, do not make much noise and heat, but they are costlier than HDDs, but the cost of SSDs are rapidly declining. Another concern with SSDs is that the cells on the SSD can last only up to a specific number of write cycles. However, they are not of much concern to home users, as SSDs utilize features such as TRIM to extend lifespan. The lifespan of the SSD will usually be mentioned, which could be anywhere between 30 - 150 TB more than the average lifespan of a computer.

1.8 APPLICATION OF COMPUTERS

The range of computer applications has penetrated each possible field. Some of the key areas are -

- **Business**- A computer performs faster calculations and provides accurate and reliable results which have made it possible to integrate with business organizations. Some of the areas where computer performs different roles are- Payroll calculations, Budgeting, Sales analysis, financial forecasting, and Managing employee database, Maintenance of stocks, etc.
- **Education**- Some of the key areas where computers are used are- student management systems, teaching tools, learning management systems, etc.
- **Marketing/Advertising** – Computers have revolutionized the advertisement industry where you can create art and graphics, write, revise and copy, and print and disseminate ads and sell more and more products.
- **Banking**- In this day and age, banking is mostly dependent on computers. Some of the facilities provided using computers are – Online accounting facility, checking current balance, making deposits and overdrafts online, checking interest charges, ATM, shares, etc.
- **Insurance**- Insurance companies keep all the records up-to-date with the help of computers. Some of the other important functions are- amount calculation, customer MIS, maturity, etc.

- E-Learning- Computers have brought a boom in the popularisation of e-learning. One can sit at home and enrich his/her learning with not just textual information but also pictorial and animated information which are easier to learn.
- Military- Computers are largely used in defence and military operations. Modern tanks, missiles, weapons, etc are some devices that can be handled by a computer.
- Desktop publishing- With desktop publishing, you can create page layouts for entire books on your personal computer.
- Medicine- Computers are a great help in the diagnosis of diseases. Various computer led software are used in magnetic resonance imaging to examine the internal organs of the human body. Computer software is also used in storing patient data and performing surgeries.

The list of areas where computer application is endless in this day and age no place has been left untouched. The above mentioned are some of them.

1.9 POINTS TO REMEMBER

- Assembly Language- It is the first step to improve the programming structure. You should know that a computer can handle numbers and letters. The symbolic programming of assembly language is easier to understand and saves a lot of time and effort of the programmer.
- High-Level languages- Assembly language and machine level language require deep knowledge of computer hardware whereas in a higher language you have to know only the instructions (Language Grammar) in English words and logic of the problem irrespective of the type of computer hardware you use.
- Von Neumann Architecture also known as the Von Neumann model is a design model for a stored-program concept wherein the computer consists of a CPU, memory and Input/output devices. The program is stored in the memory and the CPU fetches an instruction from the memory at a time and executes it.
- Freeware- Freeware is software that is distributed without demanding any cost for its usage. These programs are available either as fully functional software for an unlimited period.
- Open-source- The term ‘Open-source’ is very close to ‘free software’ but not identical. We say this because, the source code of open-source software is readily available to users as well under a copyright, and one is freely allowed to redistribute the software. The concept of an open-source program relies on the fact that a user can review a source-code for eliminating possible bugs/error in it.

- Shareware- Shareware is demonstration software that is distributed for free but for a specific evaluation period only, say, 15-30 days (Say trial version). After the evaluation period, the program gets expired and a user can no longer access the program. Only if you are interested in using the program further, the shareware provider may require you to purchase a license for the software.
- Spyware- Spyware goes a few steps further and surreptitiously installs software on your computer. The spyware may contain a code that sends information about the user's computer to the developer or some other location whenever the user is connected to the Internet.
- Malware- Typically referred as 'Malicious Software', Malware is any program with mala fide intentions which exploits data of a computer without its user's consent.
- Data and instructions cannot be entered and processed directly into computers using human language. Any type of data- numbers, letters, special symbols, sound or pictures must first be converted into machine-readable form i.e. binary form.
- The CPU is the brain of a computer system and is responsible for processing the data i.e. input from peripheral devices and output to another peripheral device.
- Byte: a group of bits (8 bits) used to represent a character. A byte is considered as the basic unit of measuring memory size in computer.
- Word: two or more bits make a word. The term 'word length' is used as the measure of the number of bits in each word. For example, a word can have a length of 16 bits, 32 bits, 64 bits, etc.
- Computer memory is used to store information (sometimes also called data and instructions) in a digital computer. A memory is divided into several parts called memory cells.
- Main memory holds instructions and data when a program is in execution, while auxiliary or secondary memory holds data and programs not currently in execution and acts as a storage medium.

1.10 GLOSSARY

- Cache Memory- Cache is a type of memory and is similar to RAM. A cache is used by the computer to move data between the RAM and CPU.
- Bit- Represents a binary digit which is the amount of information obtained by asking a 'yes' or 'no' question. This is also the smallest unit of information stored on a computer as a 0 or 1.

- Byte- Data is stored on a computer in the form of bytes. A byte is one character, which may be a number or letter. A byte is composed of 8 consecutive bits.
- Flash Drive- This is a small portable hard drive that plugs into a USB port and allows you to transport files between different computers. Also called a thumb drive.
- Graphical User Interface (GUI) - A program that helps you work easily with your operating system. Also, application programs by providing pictures and visual clues enhance your experience at work. Windows is the GUI on PCs.
- Modem- This is a way to transfer data through a telephone or cable line generally by the Internet. It may be internal or external. Some modems are used to fax or act as answering machines.
- Motherboard– The circuit board that functioning parts of the computer connect to be the motherboard. The CPU, RAM, and cache all plug into the motherboard.
- NIC (Network Interface Card) – A card is put in the computer allowing connection to a network.
- Sound Card– This device allows the computer to reproduce music, sounds, and voices. The computer needs a sound card to hear the audio portion of web sites or often to play multimedia games.
- USB Port– The Universal Serial Bus is accessed through small rectangular port on the front or back of computer that allows peripheral devices such as digital cameras and external hard drives to connect to the computer. See Ports for other types of connections.
- App- A type of application software designed to run on a mobile device, such as a Smartphone or tablet computer (also known as a mobile application).
- Bug- An error in a software program. It may cause a program to unexpectedly quit or behave in an unintended manner. The process of removing errors (bugs) is called debugging.
- PROM- Programmable Read-Only Memory.
- EPROM- Erasable Programmable Read-Only Memory.
- EEPROM- Electronically Erasable Read-Only Memory.
- ROM- Read-Only Memory.
- HDD- Hard Disk Drive.
- FDD- Floppy Disk Drive.

- CD- Compact Disk.
- DVD- Digital Versatile Discs.
- SSD- Solid State Disks.
- SDRAM- Synchronous Dynamic Random-Access Memory.
- DDR- Double Data Rate.
- EDO DRAM- Extended Data Output Dynamic Random-Access Memory.
- SRAM- Static Random-Access Memory.
- DRAM- Dynamic Random-Access Memory.
- Bit- Binary Digit.

1.11 CHECK YOUR PROGRESS

Descriptive type questions-

- a) What do you understand by Computer Generation?
- b) Draw a block diagram of a digital computer and explain it briefly.
- c) Explain input and output devices used in the computer.
- d) Write down some important applications of a computer.
- e) Distinguish between RAM and ROM
- f) Write short notes on: Primary memory and Secondary memory
- g) 'Computers play an important role in our daily lives'. Discuss in your own words.
- h) How data is stored in a computer? Define.

Objective type questions-

- a) Which of the following are components of the Central Processing Unit (CPU)?
[A] Arithmetic logic unit, Mouse [B] Arithmetic logic unit, Control unit
[C] Arithmetic logic unit, Integrated Circuits [D] Control Unit, Monitor
- b) If a computer has more than one processor then it is known as
[A] Uniprocessor [B] Multiprocessor [C] Multithreaded [D] Multiprogramming
- c) In which of the following form, data is stored in the computer?
[A] Decimal [B] Binary [C] Hexadecimal [D] Octal
- d) GUI stands for.....
[A] Graphical user Instrument [B] Graphical unified Interface

- [C] Graphical unified Instrument [D] Graphical user Interface
- e) EEPROM stands for.....
- f) RAM is of two types..... &
- g) Main memory is also known as.....
- h) Pen drive is an example of storage device.
- i) ROM is volatile memory. (True/False)
- j) Analog computers use continuous physical quantities like voltage. (True/False)

Answer (Objective type questions)-

[a] Arithmetic logic unit, Control unit [b] Multiprocessor [c] Binary [d] Graphical user Interface [e] Electronically Erasable Programmable Read Only Memory [f] DRAM & SRAM [g] Primary memory [h] Secondary [i] False [j] True.

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UNIT- 2

FUNDAMENTALS OF DIGITAL COMPUTER- II

- 2.1. INTRODUCTION

- 2.2. OBJECTIVES

- 2.3. COMPUTER MEMORY

- 2.4. BASIC INPUT OUTPUT SYSTEM (BIOS)

- 2.5. HARDWARE AND SOFTWARE

- 2.6. INTRODUCTION TO OPERATING SYSTEM

- 2.7. LANGUAGE TRANSLATORS

- 2.8. COMPUTER LANGUAGES

- 2.9. ADVANTAGES AND DISADVANTAGES OF COMPUTER

- 2.10. POINTS TO REMEMBER

- 2.11. GLOSSARY

- 2.12. CHECK YOUR PROGRESS

- 2.13. BIBLIOGRAPHY/REFERENCES

- 2.14. SUGGESTED READINGS

2.1 INTRODUCTION

Computer memory is used to store information (sometimes also called data and instructions) in a digital computer. A Memory is divided into large number of small parts called memory cells. Each memory cells or location has a unique address in the form of machine language (0/1). The computer memory is divided into- main memory and auxiliary memory.

Main memory also called primary memory and secondary memory also called storage memory. Main memory holds instructions and data when a program is in execution, while auxiliary or secondary memory holds data and programs not currently in execution and acts as a storage medium.

2.2 OBJECTIVES

After successful completion of this unit you will be able to-

- Define memory and memory types.
 - Define and distinguish Hardware and Software components of computer system.
 - Explain the types and functions of an Operating System.
 - Explain the Language translators and Computer.
-

2.3 COMPUTER MEMORY

- Primary Memory (Main Memory)
- Secondary Memory

Primary Memory (Main Memory)-

Primary memory holds instructions and data currently being processed by the CPU; the intermediate results produced during the execution of the process. The instructions and data remain in primary memory; the CPU can access them directly and quickly.

Functions of Primary Memory

- Holding data and instructions for the task assigned by input device before processing.
- Holding intermediate results while processing.
- Holding data and information after processing unless they are transferred to output unit.
- Holding programs and instructions from secondary storage device.
- Holding system programs like operating system.

Types of Primary Memory-

- Random Access Memory (RAM)
- Read Only Memory (ROM)

Random Access Memory-

It is a volatile or temporary memory. Its contents get lost once the power supply is switched off. It is also called read/write (R/W) memory. It allows CPU to read as well write data and instructions over it. It temporarily holds software, programs /instructions before and after processing of the data. RAM is used during the execution of instructions. RAM is considered “random access” because you can access any memory cell directly. RAM is made up of semiconductor material, so that; it is also called semiconductor memory, just like processors and ROM types of chips. In comparison to other memory devices (storage memory) RAM is much faster to read and write instructions and data.

RAM is also named direct access memory because the operating system, application programs and data currently in use are stored in RAM directly accessed by the CPU/processor.

The Random Access Memory (RAM) is sub divided into-

- Dynamic Random Access Memory (DRAM)
- Static Random Access Memory (SRAM)

Dynamic Random Access Memory-

It makes use of a transistor and a capacitor to form a memory cell standing for a single bit of data. DRAM is not able to retain information for a longer time even if the power supply is on because it needs refreshing frequently. It is slower and less expensive than SRAM.

Static Random Access Memory-

In SRAM flip flops are used for retaining memory. Typically, it uses four to six transistors for each memory cell. It does not have a capacitor and does not require refreshing. It can store information till the power supply is “on”. It is faster and expensive in comparison to DRAM and primarily used in processor’s cache memory.

Note- Apart from SRAM and DRAM, some other types of RAM are also available: As-

- Fast Page Mode Dynamic Random Access Memory (FPM DRAM)–

This memory is little faster in comparison to conventional DRAM. The access time is improved for this memory as it sends row address only once for accessing the neighbouring locations in memory. Despite of its name, it is still one of the slowest RAMs used today. This memory is not considered good for high-speed memory buses over 66 mhz.

- Extended Data Output Dynamic Random Access Memory (EDO DRAM)–

It can be seen as an improved version of “FPM DRAM”, as it can retain data valid for a longer period than FPM. Due to this feature, it is known as the extended data output. It stores 265 bytes of data information into latches and these latches hold next same amount of information. This arrangement makes it possible for programs to be executed sequentially without any delay.

- Synchronous Dynamic Random Access Memory (SDRAM)–

SDRAM is a generic name which refers to the many dynamic random-access memories that are synchronized with the system bus. It carries data between the CPU and the memory controller hub. It uses the features called pipelining, which accepts new data before to finish previous processing data.

- Double Data Rate - Synchronous Dynamic Random Access Memory (DDR-SDRAM)–

Double data rate SDRAM was introduced later to give an alternative to single data rate SDRAM. DDR SDRAM provides better speed than Synchronous Dynamic Random Access Memory and also consumes a lesser amount of energy. The transfer rate of data became just double as it is capable of sending data on both rising and falling edges of the clock pulse.

- Double Data Rate Type2 - Synchronous Dynamic Random Access Memory (DDR2-SDRAM)–

The speed of DDR2- SDRAM is just double in comparison to the DDR SDRAM because its input/output buffer frequency is doubled.

- Double Data Rate Type3 - Synchronous Dynamic Random Access Memory (DDR3 SDRAM)–

DDR3- SDRAM is considered as an improved version of DDR2 SDRAM. It also doubles the speed of DDR2 SDRAM. Its power consumption is lesser and the rates of data transfer ranges from 800Mbps to 1600 Mbps.

- Double Data Rate Type4 - Synchronous Dynamic Random Access Memory (DDR4 SDRAM)–

This RAM is a higher speed successor to the technology used by DDR3 SDRAM. This provides better system level reliability, capacity, performance scalability and power efficiency in comparison to all its previous memories. Such as- DDR3 SDRAM's.

Read Only Memory (ROM)

It is a non-volatile memory whose contents are not lost even the electric power is off. It stores instructions for computer startup. During the computer startup operation, the main memory (RAM) of the computer is empty because of its volatile nature, so that the computer gets instructions from the ROM to startup (booting) operation. The contents of ROM cannot be written or erased by the user. Only trained programmers and technicians can alter or write or erase the contents of ROM. ROM chips are generally designed at the time of manufacturing. ROM also performs the BIOS (Basic Input Output System) functions.

Types of Read Only Memory

- Programmable Read Only Memory (PROM)
- Erasable Programmable Read Only Memory (EPROM)
- Electronically Erasable Read Only Memory (EEPROM)

Programmable Read Only Memory (PROM)-

The data stored in PROM cannot be modified and therefore it is also known as “one-time programmable device”. It is made as a blank memory. When you want to write on a PROM chip, a ROM burner is required to write data onto a PROM chip.

Erasable Programmable Read Only Memory (EPROM)-

Unlike programmable ROM; erasable programmable ROM can write/modify data more than once. When ultra violet rays of some specific wavelength fall into EPROM's chip glass panel, the bits of memory come back to 1 and the chip enables to write.

Electronically Erasable Read Only Memory (EEPROM)-

Electrically Erasable Programmable ROM is as same as Erasable Programmable ROM, but the same work of erasing the stored data is performed with electric current. EEPROM is a type of non-volatile memory and used in computers and other electronic devices. It used to

store relatively small amounts of data and also allows individual bytes to be erased and reprogrammed. It stores computer system's BIOS (Basic Input Output System). Unlike EPROM the entire chip does not have to be erased for changing some portion of it.

Secondary Memory-

It is also known as external memory or auxiliary memory or storage memory. It is a non-volatile memory which is used to store instructions and data permanently unless erased by the user or the till the damage of the storage device. These kinds of memories are less expensive and have much larger storage capacity than primary memory. Secondary storage devices are: hard disk, pen drives, CD (Compact disks), DVD's (Digital Versatile Disc), memory card, etc.

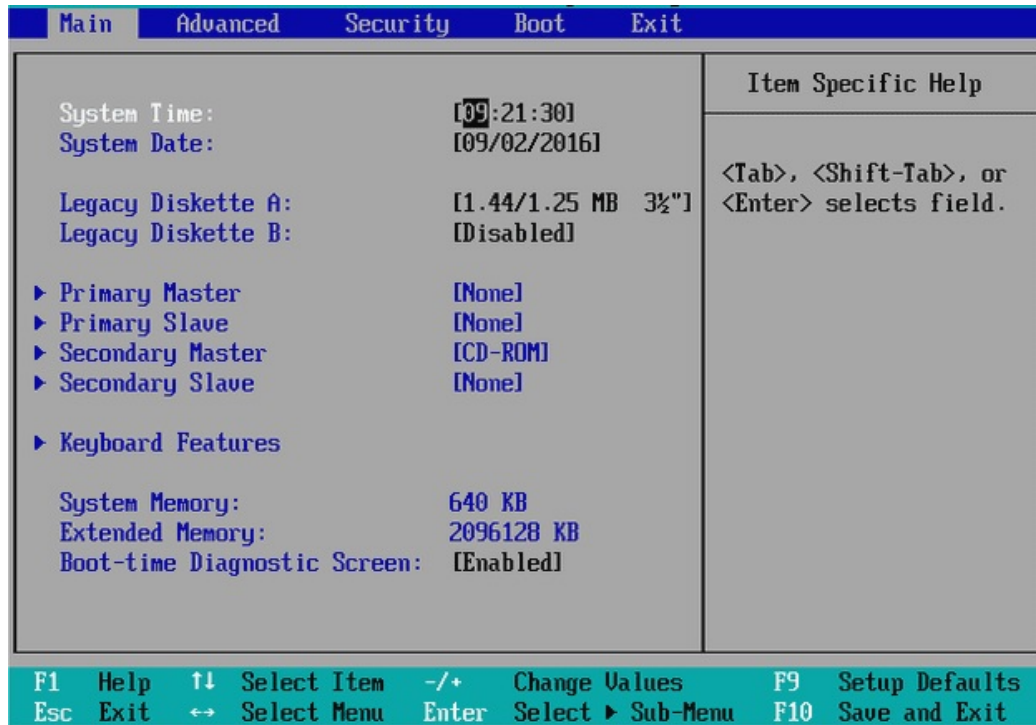
2.4 BASIC INPUT OUTPUT SYSTEM (BIOS)

The first software to run on your computer when you switched on the computer system is BIOS. BIOS is pre-installed when the computer is purchased. It reads the BIOS chip for instruction on what to do. The software programs installed on your system that you use daily, such as- browser, media player, office suite, etc. are high level software because they directly interact with the operating system not to bare hardware. BIOS is low level software because it directly controls and communicates to the hardware components of the computer system. BIOS provide a number of services that allows users and higher-level software to configure the settings for a computer system.

The four main functions of the BIOS are-

- Power - On Self Test (POST) - It ensure that all the necessary hardware components are attached to the computer before it starts. After the POST, the major components (as-keyboard, Mouse, system memory, IDE drives) are initialized and made functional.

- Bootstrap Loader- Locate the operating system and made functional. If a capable operating system is located, the BIOS will pass control to it. The BIOS looks in



Sample BIOS interface

predetermined (it is usually decided by the computer manufacturer) locations for a bootable operating system. The Common places are- the CD-ROM drive, DVD drive, Pen drive and finally the hard disk drive.

- BIOS drivers- Low-level drivers that give the computer basic operational control over your computer's hardware.
- BIOS or CMOS Setup- Configuration program that allows you to configure hardware settings including system settings such as computer passwords, date, time and etc.

To modifies/configure or view someone's BIOS settings, a special keystroke sequence must be performed at computers startup. There will be a message that indicates which keys to press, but as it is presented for no more than three seconds (and sometimes often less than one second), these common keys should be tried: F1, F2, DEL, ESC, f10.

In some secure systems, the user will be prompted for the master password, but on most Personal Computers (PC)/home systems this is disabled. Once the BIOS configuration screen is visible (See figure- Sample BIOS Interface), the user can usually modify the boot sequence, set passwords (to the OS or BIOS itself), change the processor speed, and enable/disable Num Lock on the keyboard.

Other common tasks include adjusting the system's time and date, and configuring low-level power management, such as hard disk and video shutdown. So long as the "Exit and Save"

option is required to acted. However, if one does make the wrong changes and saves them, then there is a chance that the computer will not boot, or that damage may occur to the processor and/or memory.

2.5 HARDWARE AND SOFTWARE

A computer system is made up of an arrangement of hardware and software components. The physical and tangible components of a computer that can be seen and touched are known as Hardware. Computer Hardware consists of the physical components, like input devices (keyboard, mouse, scanner etc.), output devices (monitor, printer, speaker etc.), processing device (ALU, CU) and the storage devices (Compact disk, hard disk, DVDs etc.).

Software represents the set of programs and instructions that govern the operation of a computer system. A computer system cannot do anything without software. Computer must be instructed to perform any task. For solving any computer-based problem the user has to specify the sequence of instructions which a computer must understand and follow. Sequence of instructions is called program or software.

Types of Software

Software can be divided into two major categories. As-

- System Software.
- Application Software.

System Software-

It is responsible for controlling, integrating and managing the individual hardware components of a computer system. It also provides the interface between the user and hardware components of the computer. As- Operating System (as- MS-DOS, windows XP/2000/98, Unix Linux, etc.), Device Drivers, System utility (Disk Compression, Disk Fragmenters, Backup Utilities, Disk Cleaners, Anti-Virus and etc.)

Application Software-

Application software is designed to perform customized tasks. Such as- specific personal, educational, business functions, and etc. Each program is designed to assist the user with a particular functionality. Following are the examples of different types of application software-

- Word processing software
- Database software
- Spreadsheet software
- Multimedia software
- Educational Software
- Application Suites
- Presentation Software
- Content Management Software, etc.

2.6 INTRODUCTION TO OPERATING SYSTEM

An operating system (OS) is system software. It is the manager of computer's hardware and software resources and provides a basis for application program to execute. It acts as an intermediary between the computer user and hardware. OS provides basic functionality of managing the input and output devices, performing memory allocation and de-allocation and so on. Hence the OS creates an environment in which user can execute their programs conveniently and efficiently.

Now days, OS is found on almost every device that contains computer for e.g.,' cellular phones, consoles, video games, super computers, web servers. Microsoft Windows is the most common OS, whereas Android, iOS, QNX are examples of modern operating systems. Different systems have different kind of OS depending on the kind of computation/service required; some OS are designed to be efficient others to be convenient or the combination of two for example:

Graphical user interface (GUI) displays visual elements on the screen, such as icons, windows, menus, radio buttons, check boxes and other gadgets and employs a pointing device (mouse or trackball or touch screen) in addition to a keyboard. Example- Windows Xp, Windows 7, Windows Vista, Windows 8, Android mobile operating system, and etc.

A character user interface (CUI) requiring commands (to operate) to be typed on the keyboard. To work with CUI or text based operating systems requires high levels of efficiency once the many commands are learned, but reaching this level can take a while because the command words are not easily discoverable because commands in CUI based systems are numerous and harder to remember. We can do complicated operations by combining them in relatively short sequence of commands. Examples of CUI based operating systems- DOS, Unix Shell, etc.

Types of Operating Systems-

Types of Operating systems based on their Working Techniques-

- **Serial Processing-**
It performs all the instructions into a sequence manner. In other words, the instructions those are given by the user will be executed by using the first in first out (FIFO) manner. All the Instructions those are received first by the operating system will be executed first. For execution of the instructions the program counter (PC Register) is used, which is used for executing all the instructions. The problem with this type of system is that a user can not interact with the system while he it is in execution, means the user can't be able to enter new the data for execution.
- **Batch Processing-**
It is similar to the serial processing technique, but in batch processing similar types of jobs are firstly grouped and then submitted to the system for processing. The system

then performs all the operations on the instructions one by one. During the batch processing the user can not be able to specify any input.

- **Multi Programming (executing many programs concurrently)-**
Here the computer system can execute multiple programs at a time. In multi-programming the CPU will never get idle. A multiprogramming operating system can hold more than one program in memory at the same time. In case of multiprogramming, when a job/task cannot use the processor, the system can suspend, or interrupt, the job, freeing the processor to work on another job.
- **Real Time System-**
In Real Time operating system the Response Time is already fixed. Means time to Display the Results after Possessing has fixed by the Processor or CPU. Real Time System is used at those Places in which we Requires higher and Timely Response. These Types of Systems are used in Reservation. So, when we specify the Request, the CPU will perform at that Time.
- **Multi processing Operating System-**
Generally, a computer has a single processor means a computer have a just one processor for processing the instructions. But if we are running multiple jobs, then this will reduce the speed of the processing. For increasing the speed of processing then we use the multiple processors in a single system. In multi processing there are two or more processors used in a single operating system.
- **Parallel operating system-**
This type of operating systems is used to interface multiple networked computers to complete the tasks in a parallel manner. Parallel operating systems are able to use software to manage all of the different resources of the computers running in parallel, such as memory, caches, storage space, and processing power. Parallel Operating Systems also allows a user to directly interface with all of the computers in the network.

Functions of OS-

- Processor management- It involves putting the tasks into order and pairing them into manageable size before they go to the CPU.
- Memory management- It coordinates data to and from RAM and determines the necessity for virtual memory.
- Device management- It provides interface between connected devices. Such as managing the various peripheral devices e.g., mouse, keyboard, etc.
- Storage management- It directs permanent data storage.
- Application allows standard communication between software and hardware.
- User interface allows users to communicate with computer system.
- It provides file management which refers to the way that the operating system manipulates stores, retrieves and saves data.

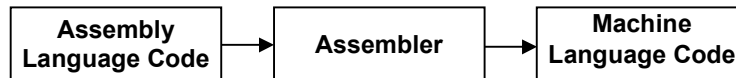
2.7 LANGUAGE TRANSLATORS

Language translators (compiler, interpreter and assembler) are system software that converts source code into machine code. A program written in high-level language is called as source code. Each of the language translators has a specific meaning, but all of them work in some way towards getting a high-level programming language translated into machine language that a processor (CPU) can understand. It also detects and reports the error during translation, if a programmer violates specification of the high-level language program. Mainly there are the following types of language translators-

- Assembler
- Compiler
- Interpreter

Assembler-

An assembler translates a program written in assembly language into machine language. Assembly language is a low-level programming language. Low-level programming languages are less like human language in that they are more difficult to understand. Assembly language code is more often used with 8-bit processors.



Compiler-

Compiler translates high-level language code to lower-level machine language all at once and then save the object code to memory. A compiler creates machine code that executes on a processor with a specific Instruction Set Architecture (ISA), which is processor-dependent. Compilers are platform-dependent.



Interpreter-

An interpreter reads the code like a compiler but and immediately executes on that code, and therefore is initially faster than a compiler. Compilers translate code all at once and the processor then executes upon the machine language that the compiler produced. If changes are made to the code after compilation, the changed code will need to be compiled and added to the compiled code (or perhaps the entire program will need to be re-compiled.) But an interpreter, although skipping the step of compilation of the entire program to start, is much slower to execute than the same program that's been completely compiled. Interpreters, however, have usefulness in areas where speed doesn't matter (e.g., debugging and training) and it is possible to take the entire interpreter and use it on another ISA, which makes it more portable than a compiler when working between hardware architectures. There are several types of interpreters: the syntax-directed interpreter, byte



code interpreter, and threaded interpreter, Just-in-Time (a kind of hybrid interpreter/compiler), and a few others.

Differences between compiler and interpreter		
S. No.	Compiler	Interpreter
1	Performs the translation of a program as a whole.	Performs statement by statement translation.
2	Execution is faster.	Execution is slower.
3	Requires more memory as linking is needed for the generated intermediate object code.	Memory usage is efficient as no intermediate object code is generated.
4	Debugging is hard as the error messages are generated after scanning the entire program only.	It stops translation when the first error is met. Hence, debugging is easy.
5	Compiler displays all errors and warning at time and without fixing all errors program cannot be executed.	Since Interpreter reads single statement so an interpreter display one error at a time and you have to fix the error to interpret next statement.
6	Programming languages like C, C++ uses compilers.	Programming languages like Python, php, and etc uses interpreters.

2.8 COMPUTER LANGUAGES

As among human beings' language is a source of communication to each other, as same in order to communicate with computer system we must have a language that can be understandable by the computer. For the purpose of performing different types of work on the computer system, we developed different types of computer languages. A computer system is operated by given a set of rules and instruction to perform some tasks. These set of rules are able to control the working of the computer. To control the computer system using these sequential set of instructions are known as programming language.

Basically, computer languages are divided into two categories- Low-Level programming Languages and High-Level programming Languages. A language that corresponds directly to a specific machine language is called Low-Level languages where as any language that is independent of the machine is called high-Level Languages.

There are some other classifications of computer languages-

- System languages: These are designed for low-level tasks, like memory and process management.

- Scripting languages: These tend to be high-level and very powerful.
- Domain-specific languages: These are only used in very specific contexts.
- Visual languages: Languages that is not text-based.

Machine language-

It is the most elementary language and was the first programming language to be developed. It is the only language, which computer can understand without any language translator. The machine language is represented inside the computer by a string of binary digits (bits) 0 and 1. The symbol 0 stands for the absence of an electric pulse and 1 for the presence of an electric pulse, so that a computer is capable of recognizing electric signals.

Advantages-

- It makes fast and efficient use of the computer.
- It does not require any language translator, because it is directly understood by the computer itself.
- It takes very less time to execute a program, because there is no conversion takes place.

Disadvantages-

- All operation codes have to be remembered.
- All memory addresses have to be remembered.
- It is hard to find errors in a program written in the machine language.
- It is machine dependent; it means particular machine language can be used on only one type of computer system.

Assembly Language-

It was developed to overcome some of the inconveniences of machine language. In assembly language operation codes and operands are given in the form of alphanumeric symbols instead of 0's and 1's in machine language. These alphanumeric symbols will be known as mnemonic codes and can be easier to understand e.g., 'ADD for addition, SUB for subtraction, START LABEL etc. The instructions of the assembly language will be converted to machine language by assembler to be executed by the computer.

Advantages-

- Assembly language is easier to understand and use as compared to machine language.
- It is easy to locate and correct errors.
- It is easily modified.

Disadvantages-

- Like machine language, it is also machine dependent/specific.
- Since it is machine dependent, the programmer also needs to understand the hardware.

High Level Languages-

High-level languages are basically symbolic languages that use English words and/or mathematical symbols rather than mnemonic codes. Each instruction in the high-level language is translated into machine language instructions that the computer can understand. High-level computer languages use formats that are similar to English. The purpose of developing high-level languages was to enable people to write their own programs easily.

Advantages-

- User-friendly
- Similar to English with vocabulary of words, all symbols therefore it is easier to learn.
- It requires less time to write and easier to maintain
- Problem oriented rather than machine based.
- Shorter than their low-level equivalents. One statement translates into many machine code instructions.
- Program written in a high-level language equivalent can be translated into machine language and therefore can run on every computer for which there exists an appropriate translator.
- It is independent of the machine on which it used i.e. programs developed in high level language can be run on any computer.

Disadvantages-

- A high-level language has to be translated into the -machine language by a translator and thus a price in computer time is paid.
- The object code generated by a translator might be inefficient compared to an equivalent assembly language program

2.9 ADVANTAGES AND DISADVANTAGES OF COMPUTER

Advantages of Computer-

- A computer is free from tiredness and fatigue. Complex and repetitive work can be done easily, quickly and accurately.
- It saves a lot precious time and labour. For example, the same letter can be sent to a number of people quickly and without much effort.
- Computer provides effective control on human mistakes, omissions and commission. In certain cases, computer also makes auto-correction of mistakes.

- Computers help in storing large volumes of data. The information can be stored for a number of years and can be retrieved as and when required. In this way it helps in overcoming the limitation of human memory.
- Analysis on complicated data can be performed easily and quickly. Different statistical packages are available in market that considerably reduces the efforts and time in doing analysis on raw data.
- Computers have made communication between people easier. Video conferencing and emails help in reducing time in making important decisions. Social networking sites have made people to reconnect with their old friends.
- Use of internet has made resource sharing possible and easy. People can share their ideas, opinions, research work and other information on internet.
- Use of computers help in saving a lot of paper as most of the work is done and stored in computers. Computers have made the concept of paperless office possible.
- People can do office work from anywhere, and can spare more time for their families. This also reduces time and resources in setting up an office.
- Computers also help people with disability to perform some of their activities for example reading software can be used by a visually disabled person for his studies.

Disadvantages of Computer-

- Computers are only machines that work only in accordance of the instructions and directions provided to them by the human (programmers).
- Computers have no IQ. They simply work on Garbage in and Garbage out (GIGO) rule that i.e., the accuracy of the results will be possible only when the input and the instructions are correct. The computer itself cannot make corrections.
- Computers need special purpose software to perform specialized task. Like Tally or any other accounting software is required to prepare financial accounts of a company. Similarly, Adobe photo- shop is required for editing photographs and adding animations to them.
- Data handling through computers is prone to the loss of information and data tampering. For example, if the hard disk of the computer crashes, then the whole data may be lost. A virus can enter into the computer can corrupt important files. A hacker can hack computer or email account for getting unauthorized access to confidential information. All this requires special protection routines.
- Computers do not have any decision making or creative abilities. They cannot create anything on their own neither they can decide what is to be done in a particular situation. They only act as per the programs written for their working which makes them rigid.

- Despite of the above said disadvantages, computers are very useful for our daily routine work. Instead of their limitations we have benefitted too much with their advantages.

2.10 POINTS TO REMEMBER

- A computer can be described as an electronic calculating device that accepts raw data as input processes it and produces meaningful information i.e. output as result.
- A computer system is made up of both hardware and software components.
- Hardware consists of the physical components of a computer system like input devices, output devices, processing device (CPU) and the storage device.
- Software represents the set of programs and instructions that govern the operation of a computer system.
- A computer is fast, accurate, versatile, reliable, diligent, and has high speed.
- The need for counting and simple computations has led to the development of several computing devices like Abacus, Napier's bones, Slide Rule, Blaise Pascal's Adding Machine, Stepped Reckoner, Punch Card System, and Hollerith's Machine etc.
- The evolution of computers can be divided into five generations. Each generation represents technological evolutions over the period of time.
- A computer has four functional units Input unit, output unit, central processing unit (CPU) and secondary storage unit.
- Input unit is used to provide data, information and instructions to the computer so that it can perform processing on data/information according to the instructions given by the user.
- Examples of input devices are including keyboard, mouse, joystick, scanner etc.
- Output devices are used to display the result of the processing done by CPU on the input provided by the user.
- Examples of output devices are monitor, printer, plotter, speaker etc.
- Printer is an output device that is used to get the hard copy of the output in the form of printed papers.
- Printers are of two types - impact printers and non-impact printers.
- Impact use electromechanical mechanism which makes mark on the paper by physically striking a head or a needle against an ink ribbon.
- Dot matrix printers, Daisy wheel printers and Drum printers are examples of impact printers.

- Non-impact printers do not make a striking or hitting action on a ribbon to print. They use thermal, electrostatic chemical, laser beam and ink jet technologies for printing on paper.
- Inkjet and laser printers are examples of non-impact printers.
- They are used to create high resolution graphs, images charts, blueprints, maps, circuit diagram and other line-based diagrams.
- There are two kinds of plotter- Drum plotter and Flat-bed plotter.
- CPU is referred to as the brain and heart of the computer system which is responsible for all the processing done on the data entered by using input device.
- CPU consists of three units Control Unit (CU), Arithmetic & Logical Unit (ALU) and Main/Primary storage unit.
- Control Unit is responsible for interpreting the instructions provided by the user and directing the sequence of operations accordingly.
- ALU performs arithmetic and logical operations on the data. It performs four basic mathematical operations i.e., addition, subtraction, multiplication and division, three comparative or logical operations i.e., 'greater than', 'less than', 'equals to' to compare numbers, letters or special characters between data items.
- Main memory holds instructions and data currently being processed by the CPU, the intermediate results produced during the course of calculations and recently processed data.
- Main memory is of two kinds Random Access Memory (RAM) & Read Only Memory (ROM).
- Random Access Memory is a volatile memory and temporarily holds software, programs and instructions before and after processing.
- Read Only Memory is non-volatile memory whose contents are not lost even after the loss of electric power. It contains startup instructions.
- Secondary memory is also known as external memory or auxiliary memory, and is required to supplement the limited capacity and volatile characteristics of primary memory.
- A Computer has few limitations like they don't have IQ, they don't have emotions, they lack decision making power etc.
- Computers play a vital role in every sphere of our life like education, home, entertainment, communication, research, banking, medicine and health and so on.
- On the basis of purpose computers can be divided into two categories - General Purpose Computers and Special Purpose Computers.
- On the basis of technology used by them, computers can be divided into three categories i.e. Analog, Digital and Hybrid computer.

- On the basis of size and capacity, computers are of four kinds – super computers, mainframe computer, minicomputer and microcomputer.

2.11 GLOSSARY

- **Vacuum Tubes-** Vacuum tube is a device that controls electric current through a vacuum in a sealed container. Vacuum tubes contain electrodes for controlling electron flow in early computers that used them as a switch or an amplifier.
- **Transistors-** A transistor is a semiconductor device that regulates current or voltage flow and acts as a switch or gate for electronic signals.
- **COBOL-** COBOL is a high-level programming language. It used to provide instructions to the computer to perform a specific task. Its full form is Common Business-Oriented Language.
- **FORTRAN-** COBOL is a high-level programming language. It used to provide instructions to the computer to perform a specific task. Its full form is Formula Translating System.
- **Integrate Circuits-** An integrated circuit is a set of electronic circuits on one small plate or chip, made of semiconductor material, normally silicon. There are thousands or millions of tiny resistors, capacitors, and transistors are fabricated on it.
- **LAN, WAN and MAN-** They are the types of networks established using digital computers. LAN is the Local Area Network which is created by connecting computers of an organization using wires. WAN is Wide Area Network created by connecting computers of two or more organizations in the same city using internet. MAN is Metropolitan Area Network, which is created by connecting computers of two or more organizations located in two different cities.
- **Parallel Processing-** Parallel processing is the use of more than one CPU or processor core at the same time to execute a program thereby making its execution faster.
- **Virus-** A computer virus is a malware program. It replicates itself into other computer programs, data files, or the boot sector of the hard drive. Viruses often perform some type of harmful activity on infected computers, such as stealing hard disk space or CPU time, accessing private information, corrupting data, displaying political or humorous messages on the user's screen, spamming their contacts, or logging their keystrokes.

2.12 CHECK YOUR PROGRESS

Part- A (Fill in the blanks and True/False type questions)

- a) EEPROM stands for.....
- b) RAM is of two types..... &

- c) Main memory is also known as.....
- d) Param Yuva II is an example of computer.
- e) Pen drive is an example of storage device.
- f) 1. Initial startup instructions are stored in RAM.
- g) 2. ROM is volatile memory.
- h) 3. Analog computers use continuous physical quantities like voltage.
- i) 4. The ‘Difference Engine’ was developed by Blaise Pascal.
- j) 5. A digital computer is faster than analog computer.

Part- B (Descriptive type questions)

- (1) Explain with the help of diagram the functional units of a computer system.
- (2) Distinguish between RAM and ROM
- (3) Write short notes on: Primary memory, Secondary memory
- (4) ‘Computers play a very important role in our daily lives’. Discuss in your own words.
- (5) List out the advantages and disadvantages of a computer system.

Answers- (Part A- Fill in the blanks and True/False type questions)	
(a) Electronically Erasable Programmable Read Only Memory	(b) DRAM & SRAM
(c) Primary memory	(d) Super
(e) Secondary	(f) False
(g) False	(h) True
(i) False	(j) True

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UNIT- 3

ICT RESOURCES AND APPLICATIONS: AN INTRODUCTION- II

3.1	INTRODUCTION
3.2	OBJECTIVES
3.3	SOFTWARE OVERVIEW
3.4	TYPES OF SOFTWARE
3.5	PROGRAMMING LANGUAGES
3.6	INTRODUCTION TO OPEN-SOURCE SOFTWARE
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3.8	GLOSSARY
3.9	CHECK YOUR PROGRESS
3.10	BIBLIOGRAPHY/ REFERENCES
3.11	SUGGESTED READINGS

3.1 INTRODUCTION

There is an urgent need for quality software and digital materials for use in schools. Teachers and students must become discerning and knowledgeable ICT users. The school environment has to be fully supportive of ICT, making available expert assistance and advice to the teacher in this rapidly-changing field. New forms of curriculum and assessment are called for new ways of organising schools if the dramatic educational potential of ICT is to be delivered and realised. A report made by the National Institute of Multimedia Education in Japan proved that an increase in the use of ICT in education with integrating technology to the curriculum has a significant and positive impact on student achievements. The results specifically showed that the students who are continuously exposed to technology through education has better ‘knowledge’, presentation skills, innovative capabilities, and are ready to take more efforts into learning as compared to their counterparts. In this unit, we will discuss ICT resources from the viewpoint of software resources used for technology-enhanced education.

3.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Understand the overview of the software and its role.
- Explore the types of software.
- Define Operating system, its functions, and types.
- Define programming languages.
- Explore the free and Open-Source Software (FOSS).

3.3 SOFTWARE OVERVIEW

Software is a way to communicate with the blind hardware of the computer system. It consists of all the instructions that tell the hardware how to perform a task. Software is developed through a programming language. Software, commonly known as programs or apps can be broadly divided into two categories- (i) System Software and (ii) Application software.

System software helps to run the computer hardware and computer system itself. System software includes operating systems, device drivers, diagnostic tools, and more. An operating system is a type of system software that manages the hardware and creates the interface between the hardware and the user.

Application software allows users to accomplish one or more tasks. It is meant to perform several tasks for the user including word processing, web browsing, and other task which require installation of the software. Applications software are designed and developed as per the users/customers requirements.

3.4 TYPES OF SOFTWARE

[1] System Software-

System software comprises device drivers, operating systems, servers, software components, and programming software (for writing programs through tools such as editors, linkers, debuggers, compilers/interpreters, and others). The most important is the operating system, here we will discuss the operating system.

Operating System-

An operating system handles signals or instructions received from input and output devices, manages memory usage, and control peripherals. Therefore, the operating system is the most important program a computer must run on. DOS (Disk Operating System), Microsoft Windows XP, and Mac OS are some examples of personal computer operating systems. Server-level computers use operating systems such as UNIX and Microsoft Windows Server.

Portable devices, such as cellular phones, smartphones, and personal data assistants use specialized, 'embedded' operating systems that enable them to do many tasks. Some of the functions operating system include- starting the computer (also called 'booting'), managing and monitoring other programs, memory management, communications management, management of peripheral devices, enabling interaction between the user and the computer system through the use of external input devices, monitoring and security of access to data and applications.

Today's personal computers use a Windows-based operating system that incorporates many of the original concepts in DOS. Operating systems differ in functionality, flexibility, and ease of use. Today there are a number of different operating systems in use. They can be as either classified as personal operating systems, network (client/servers) operating systems, and handheld operating systems.

To interact with the computers a user uses a part of the operating system called a user interface. The functions of the user interface are to start application programs, manage secondary storage, such as hard disks, as well as manipulate files and folders, and finally shut down the computer safely. The three principal types of interfaces are-

- Graphical User Interface (GUI)
- Command-line interface/Character User Interface (CUI)

A graphical user interface is a form of user interface that allows users to interact with electronic devices through graphical icons, menu and an audio indicator such as primary notation. A GUI is a user-friendly interface that eliminates the need to remember complex computer commands. CUI is a way for users to interact using commands with computer programs. In CUI based computers user interacts using text-based commands. Examples CUIs are MS-DOS and the Windows Command Prompt.

Functions of an Operating System-

- Managing computer resources- The operating system allows application software programmes such as word processing, spreadsheet, and database packages to communicate with the computer's hardware. For example, if you work on a document in Excel and you want to print the document, you just press the print button on the toolbar. Excel will direct the operating system to select a printer to print the document. The operating system then notifies the computer to begin sending data and instructions to the appropriate program to get the document printed. The operating system, therefore, acts as an interface between the application programmes and the hardware.
- Managing files and memory- The operating system manages all files on a computer. It keeps tracks of the locations where programmes and data are stored within the computer's memory. For example, when you open a file that has been saved to the hard

drive you are first instructing the computer to find the file and then to open it. The operating system also allows you to easily find files stored in secondary storage devices. Other file management functions include copying, erasing, renaming, and backing-up files.

- **Maintaining security-** In networks and larger computers, each user is given a user name or ID and password to gain access to the computer system. The operating system keeps a register of all these names so that only persons with valid usernames and passwords can access the system. This prevents access by hackers and unauthorised persons. The operating system also keeps a log to records users logged in, the length of time each user stayed on the system, and the tasks they performed. Administrators can check the log to look for security breaches and the abuse of resources.
- **Managing tasks-** A computer can perform many tasks simultaneously. One way of doing this is multi-tasking – the ability of the computer to run more than one programme at the same time. For example, a user can listen to music on his/her computer while typing a document or typing an e-mail while another e-mail is being sent. In the case of networks, the multiuser operating system allows more than one user to access the same data at the same time.
- **Providing a user interface-** Many operating systems functions are never apparent on the computer's display screen. What you see on the screen is called the user interface. The interface helps the user to interact with the computer.

Types of operating systems-

[a] Batch operating system-

It is a type of operating system where users directly do not interact with the computer system. The user prepares his/her job in the form of batch (a group of tasks) and submits it to the computer for processing. To speed up processing, jobs with similar needs are batched together and run as a group. The batch operating system has some difficulties- lack of interaction between the user and the job, slower speed of the mechanical I/O devices than the CPU, difficulty in providing the desired priority, etc. However, some advantages involved with the batch operating system are- It is very difficult to guess time required for any job to complete, processors of the batch systems know how long the job would be when it is in a queue, the idle time for the batch system is very less, etc.

[b] Time-sharing operating systems-

Time-sharing is a technique that enables many people located at various terminals to use a particular computer system at the same time. Time-sharing or multitasking is a logical extension of multiprogramming. The processor's time which is shared among multiple users simultaneously is termed as time-sharing. The main difference between Multiprogrammed

Batch Systems and Time-Sharing Systems is that in the case of Multi programmed batch systems, the objective is to maximize processor use, whereas, in Time-Sharing Systems, the objective is to minimize response time.

[c] Distributed Operating System-

The distributed operating systems are referred to as loosely coupled systems or distributed systems. These system's processors differ in size and function. The major benefit of working with these types of operating system is that it is always possible that one user can access the files or software which are not present on his system but some other system connected within this network i.e., remote access is enabled within the devices connected in that network.

[d] Network operating System-

A Network Operating System runs on a server and provides the server the capability to manage data, users, groups, security, applications, and other networking functions. The primary purpose of the network operating system is to allow shared file and printer access among multiple computers in a network, typically a local area network (LAN), a private network, or to other networks. Examples of network operating systems include Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD. The network operating systems are having the following features- centralized servers, high security at the server level, upgrades to new technologies and hardware that can be easily integrated into the system, etc.

[e] Real-time operating System-

A real-time system is defined as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. The time taken by the system to respond to an input and display of required updated information is termed as the response time. A real-time operating system must have well-defined, fixed time constraints, otherwise, the system will fail. For example, scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, air traffic control systems, etc.

[2] Application Software-

Computer software is basically programs and procedures intended to perform specific tasks on a computer system. The user directly deals with the application software for a specific purpose. The application software (program) also called end-user programs or apps can be a single program or a group of small programs often referred as an application suite. Some examples of application software are-

- Word processing software (example- MS Word, WordPad, and Notepad).
- Database software (example- Oracle, MS Access, MY SQL, etc).

- Spreadsheet software (example- Apple Numbers, Microsoft Excel, Open Office).
- Multimedia software (example- Real Player, Media Player, VLC player, etc).
- Presentation Software (example- Microsoft PowerPoint, Keynotes, open office, etc).
- Enterprise Software (example- Customer relationship management system, Hospital Management Software, etc).
- Information Worker Software (example- Documentation tools, resource management tools, etc).
- Educational Software (example- dictionaries like Encarta and Britannica, mathematical software like MATLAB and others like Google Earth, NASA World Wind).
- Simulation Software (example- Flight and scientific simulators).
- Application Suites (example- OpenOffice, Microsoft Office).
- Software for Engineering and Product Development (example- IDE or Integrated Development Environments).

Utility programs-

Utility programs, as the name suggests not only help in executing various crucial tasks for the operating system but also help in the overall maintenance of the computer system. Operating systems such as Windows, macOS, and Linux come with their own set of utility programs to maintain and execute different utility functions such as formatting, compressing, scanning, exploring, and much more. Utility programs also assist with the management of computer functions, resources, and files. Some common tasks performed by utility programs are- Disk Defragmentation, Disk Clean-up, File Management, Compression, Disk Management, Antivirus, Firewall, etc.

3.5 PROGRAMMING LANGUAGES

Do you use various applications (apps) in your smart phone? Do you ever think about how to develop these apps? Answer is simple, all the applications are developed using programming languages. There are a bunch of programming languages available. A computer is a device that can accept human instruction, processes it, and responds to it. In other words, a computer is a computational device which is used to process the data under the control of a computer program.

Computer programming languages allow us to give instructions to a computer in a language the computer understands. Just as many human-based languages exist, there is a list of computer programming languages that programmers can use to communicate with a computer. The portion of the language that a computer can understand is called a binary. Translating programming language into computer understandable language (or in binary) is

known as 'compiling.' Each programming language has its own translator (except machine language). Some popular languages of computer are- C, Python, C++, C#, R, Ruby, ADA, Java, Visual BASIC, Perl (Practical Extraction and Report Language), PHP, JavaScript, PROLOG (Programming in Logic), Document formatting languages (e.g., TeX, PostScript, SGML), etc.

A computer program is a sequence of instructions along with data to process needful action. In other words, a computer is a computational device that is used to process the data under the control of a computer program. So, these computer programs are written using a programming language which is called high-level programming languages. High-level programming languages are nearly human languages which are more complex than the computer understandable (computer only understands binary language) language which is called machine language, or low-level language. Basically, computer programming languages are divided into two categories, as- low-level language and high-level language.

Example of a low-level programming language is machine language.

Examples of some high-level programming languages are- FORTRAN (Formula Translation), ALGOL (Algorithmic Language), LISP (List Processing), COBOL (Common Business-Oriented Language), BASIC (Beginner's All-purpose Symbolic Instruction Code), SQL (Structured Query Language), Pascal, Logo, Ada, etc.

Note- The advantages of both the low- and high-level programming language are merged within the middle-level languages. Examples of such languages are- C, C++, JAVA, C#, etc.

Characteristics of a programming Language–

- A programming language must be simple, easy to learn and use, have good readability, and is human recognizable.
- A portable programming language is always preferred.
- Programming language's efficiency must be high so that it can be easily converted into machine code and executed consumes little space in memory.
- A programming language should be well structured and documented as it is suitable for application development.
- Necessary tools for development, debugging, testing, and maintenance of a program must be provided by a programming language.
- A programming language should provide a single environment known as the Integrated Development Environment (IDE).
- A programming language must be consistent in terms of syntax and semantics.

3.6 INTRODUCTION TO OPEN-SOURCE SOFTWARE

Open-source software is released through a specific kind of license that makes its source code legally available to end-users. There are many such licenses, but typically software is considered Open-source if-

It is available in source code form without additional cost i.e., users can view the code that comprises the software and make any kind of changes to it they want.

The source code can be repurposed into other new software, meaning anyone can take the source code and distribute their program from it.

Is open-source software always free?

Open-source software does not necessarily mean that executable software is given always free because converting that source code into an enforceable code requires expertise, time, and servers.

Open-source software is also sometimes conflated with the free software movement, which can add to the confusion around whether Open-source means 'free.' The free software movement grew out of the 'hacker culture' of the 1970s and was formally founded by Richard Stallman as part of the GNU Project and the non-profit Free Software Foundation. Usually, 'free software' is meant to emphasize freedom in the rights of end-users, but can sometimes be confused as meaning 'free of cost.'

One thing is interesting, neither free software nor open-source software denotes anything about cost both the kinds of software can be legally sold or given free. The primary difference between them has to do with the sharing. For free software, if you make changes to source code and want to share them, you also have to share those changes back with the original project. For open-source software, there is typically no such restriction. Despite their practical differences, free software and open-source software do share common values. Both the terms 'free' and 'Open-source' are combined in a common phrase, as "Free and Open-Source Software" (FOSS).

FOSS vs. Proprietary Software-

The key difference between proprietary software and FOSS is the availability of the source code. Proprietary or commercial software like Microsoft Windows and Adobe Photoshop are not available to end-users as source code where free software like the Linux kernel and open-source software such as Google Chromium (the basis of the Chrome web browser) are available as source code through their respective licenses.

The Open-source license allows software to be freely used, modified, and shared. It should also be approved by the Open-source Initiative (OSI), a license must go through the Open-source Initiative's license review process. Some popular open-source licenses are- Apache

License 2.0, BSD 3-Clause 'New' or 'Revised' license, BSD 2-Clause 'Simplified' or 'FreeBSD' license, GNU General Public License (GPL), GNU Library or Lesser General Public License (LGPL), MIT license, Mozilla Public License 2.0, Common Development and Distribution License and Eclipse Public License version 2.0.

Why does Open-source software matter?

Open-source software matters to everyone, not just programmers because it unlocks the potential of many more people to become innovators than a closed-source (proprietary Software) model. Open-source communities, for instance, are organized around Open-source projects where anyone with skills can join and contribute code. These groups still maintain standards around contributing to Open-source projects just like proprietary software teams do but they open up this process to anyone in the world who wants to contribute.

This open-source development model has resulted in some of the most important applications and cloud platforms in use today. The most popular of which comprise LAMP (Linux, Apache, MySQL, PHP), a model of service stacks that undergird much of the web.

Brief about LAMP-

Linux- is an open-source Operating System (OS) and the largest Open-source project in the world.

Apache- is an open-source cross-platform web server that played a key role in the early web.

MySQL- is an open-source Relational Database Management System (RDBMS) used by many database-driven web applications.

PHP- a general purpose scripting language used in software development (Perl or Python languages are sometimes substituted).

Other examples of popular Open-source technologies include the Android mobile OS, the Mozilla Firefox web browser, the widely-used version control system Git, and the two related office suites OpenOffice and LibreOffice. On a broader scale, most innovation in the areas of cloud computing, big data, and artificial intelligence have been derived from open-source software projects.

Open-source software has other advantages for businesses and individual programmers. When source code is open, it makes it easier for anyone to study it to develop new programming skills. Open-source licensing also allows students to get practice by editing the code and sharing it with friends and the broader open-source community, or even contributing fixes to existing Open-source projects. The open-source software also offers businesses the ability to customize it to meet their specific needs. Some also prefer open-source software because there are many more developers looking for security vulnerabilities when the source code is openly available and has an active community supporting it. The

open-source way is so effective because it can attract tremendous technical talent much of the innovation in technology is taking place in the Open-source community, and people all over the world end up using open-source software.

SourceForge (<https://sourceforge.net>)-

SourceForge is an Open-Source software community resource dedicated to helping open-source projects as successful as possible. It helps to create a premiere resource for open-source software development and distribution.

With the tools it provides, developers on SourceForge create powerful software in over 502,000 projects and host millions of registered users. It also connects more than 32 million monthly users with all of these Open-source projects and serves more than 2.6 million downloads a day. The SourceForge business software directory lists over 50,000 software titles. IT professionals come to SourceForge to develop, download, review and publish Open-source, and business software. SourceForge is the largest, most trusted destination for Open-source Software discovery, software reviews, and software development on the web.

3.7 POINTS TO REMEMBER

- Software is a way to communicate with the blind hardware of the computer system. It consists of all the instructions that tell the hardware how to perform a task.
- System software helps to run the computer hardware and computer system itself. System software includes operating systems, language translators, device drivers, diagnostic tools, and more.
- Application software is the category of programs which include word processing, web browsing, and almost any other task for which you might install the software. Applications software are designed and developed as per the users/customers requirements.
- An operating system handles signals or instructions received from input and output devices, manages memory usage, and control peripherals.
- Some of the functions operating system include- starting the computer (also called 'booting'), managing and monitoring other programs, memory management, communications management, management of peripheral devices, enabling interaction between the user and the computer system through the use of external input devices, monitoring and security of access to data, and applications.
- To interact with the computers, a user uses a part of the operating system called a user interface, which is basically of two types e.g.,' Graphical User Interface (GUI), Character User Interface (CUI).

- The operating system manages all files on a computer. It keeps tracks of the locations where programmes and data are stored within a computer's memory.
- A Network Operating System runs on a server and provides the server the capability to manage data, users, groups, security, applications, and other networking functions.
- Time-sharing is a technique that enables many people located at various terminals to use a particular computer system at the same time.
- Utility programs not only help in executing various crucial tasks for the operating system but also help in the overall maintenance of the computer system.
- Computer programming languages allow us to give instructions to a computer in a language the computer understands. Just as many human-based languages exist, there is a list of computer programming languages that programmers can use to communicate with a computer.
- Open-source software is released through a specific kind of license that makes its source code legally available to end-users.

3.8 GLOSSARY

- GUI- Graphical User Interface.
- CUI- Character User Interface.
- LAMP- Linux, Apache, MySQL, and PHP.
- FOSS- Free and Open-source Software.
- IDE- Integrated Development Environment.
- DOS- Disk Operating System.

3.9 CHECK YOUR PROGRESS

Descriptive type questions-

- a) Why does Open-source software matter?
- b) Define FOSS and Proprietary Software.
- c) Is open-source software always free?
- d) What do you understand by programming languages?
- e) Define the role of Application software.
- f) Briefly define the types of operating system.
- g) Why Operating system is important for the execution of a computer system?

Objective type questions-

- a) System software includes operating systems, language translator, device drivers, etc. (True/False)
- b) Operating systems differ in functionality, flexibility, and ease of use. (True/False)
- c) The operating system manages only folders on a computer. (True/False)
- d) A Network Operating System runs on a server and provides the server the capability to manage data, users, groups, security, applications, and other networking functions. (True/False)
- e) The operating system keeps tracks of the locations where programmes and data are stored within the computer's memory. (True/False)
- f) A computer program is a sequence of instructions along with a memory to process needful action. (True/False)
- g) The Open-source license allows software to be freely used, modified, and shared. (True/False)

Answers (objective type question)-

- [a] True [b] True [c] False [d] True
[e] True [f] False [g] True

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- http://cs.sru.edu/~mullins/cpsc100book/module02_introduction/module02-03_introduction.html
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- <https://www.geeksforgeeks.org/types-of-operating-systems/>
- <https://www.studytonight.com/operating-system/types-of-os>
- <https://www.educba.com/what-is-application-software-its-types/>
- <https://www.computerscience.org/resources/computer-programming-languages/>
- <https://www.britannica.com/technology/computer-programming-language/SGML>
- <https://www.redhat.com/en/topics/open-source/what-is-open-source-software>
- <https://opensource.org/licenses>

3.11 SUGGESTED READINGS

- Sinha, P.K. "Computer Fundamentals: Concepts, Systems and Applications", BPB.
- Rajaraman V. "Fundamentals of Computers", Prentice Hall India Pvt., Limited.

UNIT- 4

ICT RESOURCES AND APPLICATIONS: AN INTRODUCTION- III

4.1	INTRODUCTION
4.2	OBJECTIVES
4.3	ICT RESOURCES AND NEW AGE LEARNING SKILLS
4.4	OPEN EDUCATION AND OPEN LEARNING INITIATIVES
4.5	LIST OF POPULAR DIGITAL REPOSITORIES FOR TECHNOLOGY ENABLED EDUCATION
4.6	BRIEF OVERVIEW OF LEARNING MANAGEMENT SYSTEM
4.7	POINTS TO REMEMBER
4.8	GLOSSARY
4.9	CHECK YOUR PROGRESS
4.10	BIBLIOGRAPHY/ REFERENCES
4.11	SUGGESTED READINGS

4.1 INTRODUCTION

The applications of ICT in our daily life have changed the ways individuals' access and elaborate knowledge. In the 21st century, digital skills are essential for learning and even living a successful life (accessing resources at anytime and anywhere). In order to grab the new opportunities, digital technologies are opening possibilities in many areas. Individuals have to develop the right set of skills to make meaningful use of these technologies in their life. Increasing use of digital technologies at work (especially in teaching & learning) is raising the demand for new skills along with the following directions-

- ICT specialist skills to programme, develop applications, and manage networks.
- ICT generic skills to use such technologies for professional purposes.
- ICT complementary skills to perform new tasks associated to the use of ICTs at work, e.g., information-processing, self-direction, problem-solving, and communication.

Raising the demands of new-age skills, digital technologies are also creating new opportunities for skills development. Massive Online Open Courses (MOOCs) and Open Educational Resources (OER) modify learning methods and give access to quality resources to a larger population. The use of digital technologies in formal education and vocational training has the potential to improve learning, although the outcomes depend on the capacity to link these tools to effective pedagogy. Here we are going to elaborate on some useful ICT resources and repositories for future use and access as well as we will briefly describe the overview of the Learning Management System (LMS).

4.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define new age learning skills.
- Explore open education and learning initiatives.
- Explore digital repositories for e-learning.
- Define Learning Management System.

4.3 ICT RESOURCES AND NEW AGE LEARNING SKILLS-

Knowledge involves two components, e.g., 'inter-linked content and skills. Content includes facts, ideas, principles, evidence, and descriptions of processes or procedures. Generally, subject instructors are well trained in content and have a deep understanding of the subject areas in which they are teaching. Skill development is the process of lifelong learning. The new-age learning skills include-

- **Communications Skills-** With the traditional communication skills of reading, speaking, and writing coherently and clearly, we need to add social media communication skills. These might include the ability to create a short YouTube video to capture the demonstration of a process or to pitch sales, the ability to reach out through the Internet to a wide community of people with one's ideas, to receive and incorporate feedback, to share information appropriately, and to identify trends and ideas.
- **The ability to learn independently-** To take responsibility for working out what you need to know and where to find that knowledge. This is an ongoing process in knowledge-based work because the knowledge base is constantly changing. It could be learning about new equipment, new ways of doing things or learning from whom do you need to get the job done.
- **Ethics and responsibility-** Are the essential values required to build trust in both the real and the business world where there are many different players and a greater degree of reliance on others to accomplish one's own goals.

- Teamwork and flexibility- Although many workers work independently or in very small companies they depend heavily on collaboration and the sharing of knowledge with others in related but independent organizations.
- Thinking Skills- e.g., critical thinking, problem-solving, creativity, originality, and strategizing are one of the most important skills needed in a knowledge-based society. The teaching community should have always pride in themselves on teaching such intellectual skills.
- Digital Skills- Most knowledge-based activities depend heavily on the use of information technology. However, the key issue is that these skills need to be embedded within the knowledge domain in which the activity takes place. The use of digital technology needs to be integrated and evaluated through the knowledge-base of the subject area.
- Knowledge Management- Is perhaps the most over-arching of all the skills. Knowledge is not only rapidly changing with new research, new developments, and rapid dissemination of ideas and practices over the Internet. But the sources of information are increasing with a great deal of variability in the reliability or validity of the information.

4.4 OPEN EDUCATION AND OPEN LEARNING INITIATIVES

Open education is education without academic admission requirements and is typically offered online. Open education broadens access to the learning and training traditionally offered through formal education systems. The qualifier ‘open’ refers to the elimination of barriers that can preclude both opportunities and recognition for participation in institution-based learning. One aspect of openness or ‘opening up’ education is the development and adoption of open educational resources. (Source: https://en.wikipedia.org/wiki/Open_education).

Programs are commonly offered by the educational institutions in online mode or using open and distance learning mode like e-learning, MOOC, and Open Course Ware to eliminate the entry barriers e.g., with no academic admission requirements. Where many e-learning programs are free to follow the costs of acquiring a certification may be a barrier. Thus, many open education institutes offer free certification schemes accredited by organizations.

In other words, open education is a collection of practices that utilize online technology to freely share knowledge. The open education movement not only includes the sharing of knowledge but also follows the following features-

- Publishing research in open journals (open access publishing)

- Releasing data to be reused by others (open data)
- Using, sharing and collaboratively creating software and computer code (open-source software)
- Flexible admission policies to institutions or courses (open admissions or open registration)
- Student assignments that promote student publishing or participating on the open web (open teaching or open pedagogy)
- Sharing of teaching and research practices (open scholarship)
- Sharing and reuse of teaching and learning materials (open educational resources) including courses (open courseware) and textbooks (open textbooks)

The above literature is a thematic idea to briefly understand the open education and the types of activities that the 'open education' encompasses. The 'open education' develops the learning opportunity for the deprived section of the society with quality learning material globally. To grab the advantages of open education movement someone needs to have basic IT literate and Internet savvy.

List of useful resources to access quality learning material-

[a] Open Learning initiatives at Carnegie Mellon University (<https://oli.cmu.edu/learn-more-about-oli>)-

You may visit the above link, to freely access the bunch of courses offered under Open Learning initiatives (OLI).

[b] Open Learning Initiative at Stanford University (<http://oli.stanford.edu>)-

Open Learning initiative courses are openly and freely available to anyone in the world at Stanford University who wants to learn- whether you are a student at a college or university or learning on your own; you can avail the OLI courses using the following link- <http://oli.stanford.edu>.

[c] Open Learning at Harvard (<https://www.extension.harvard.edu/open-learning-initiative>)-

One can visit the Harvard Open learning initiatives and explore the open courseware (free courses).

[d] Open Learning at lumen learning (<https://lumenlearning.com/courses>)-

One can visit the lumen learning (<https://lumenlearning.com/courses>) initiatives of open learning and explore the open courseware (free courses).

4.5 ***LIST OF POPULAR DIGITAL REPOSITORIES FOR TECHNOLOGY ENABLED EDUCATION***

Online Learning Resources (under the NMEICT, MHRD, Govt. of India)-

- E-PG Pathshala (epgp.inflibnet.ac.in) - e-PG Pathshala is an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC. e-Adhyayan, e-Pathya, and UGC-MOOCs are more initiatives of NMEICT where under e-Adhyayan 700+ e-Books and video contents for the Post-Graduate Courses are provided.
- NCERT e-books (www.ncert.nic.in/textbook/textbook.htm)-
- Spoken Tutorial (www.spoken-tutorial.org)- It is an educational content portal where one can learn various Free and Open-source Software by oneself. The courses offered are of self-paced, multi-lingual that anybody with a computer and a desire for learning, anyone can learn from any place, at any time and in a language of their choice.
- Digital Library Inflibnet (www.inflibnet.ac.in)- The Ministry of Human Resource Development (MHRD) has formed e-ShodhSindhu merging three consortia initiatives, namely UGC-INFONET Digital Library Consortium, National Library, and Information Services Infrastructure for Scholarly Content (NLIST) and Indian National Digital Library in Engineering Sciences and Technology (INDEST)-All India Council for Technical Education (AICTE) Consortium. The e-ShodhSindhu provides current as well as archival access to more than 15,000 **core** and peer-reviewed journals and many bibliographic, citation, and factual databases in different disciplines.
- SWAYAM PRABHA (TV Channel)-
- E-pathshala (www.epathshala.nic.in)-
- Tamanna (www.ncert.nic.in/tamanna/tamanna.html)-
- NISHTHA (www.itpd.ncert.gov.in)-
- Talk to Teacher (aview.in)- A-VIEW is an indigenously built multi-modal, multimedia e-learning platform that provides an immersive e-learning experience that is almost as good as a real classroom experience. A-VIEW is part of the talk to a teacher program coordinated by IIT Bombay and funded by the Ministry of Human Resource Development (MHRD).
- Consortium for Educational Communication (www.cec.nic.in)- It is an Inter-University Centers set up by the University Grants Commission (UGC) of India. It has been established to address the needs of higher education through the use of a powerful

medium of television along with the appropriate use of emerging Information Communication Technology (ICT).

- FOSSEE (www.Fossee.in)- Free Open-source Software for Education (FOSSEE) project promotes the use of FOSS tools to improve the quality of education in our country. This project aims to reduce dependency on proprietary software in educational institutions.
- E-Kalpa (www.dsource.in)- This project presents three initiatives – providing digital online content for the design, a social networking environment for design & higher learning, and creating a digital resource database on design. The project would focus on knowledge accumulation, storing and dissemination, and education in four sectors - University, Industry, Government, and the Informal sector.
- Virtual Labs (www.vlab.co.in)- This initiative has been taken by the Ministry of Human Resource Development (MHRD). Virtual Labs project is a consortium activity of 12 participating institutes among them, the IIT Delhi is coordinating institute. Virtual Labs do not require any additional infrastructural setup for conducting experiments at user premises. The intended beneficiaries of this project are- all students and faculty members of science and engineering, high-school students whose inquisitiveness will be triggered, researchers, and engineering colleges who can share the given resources.
- Open-source Courseware Animations Repository (<http://oscar.iitb.ac.in/oscarHome.do>)-
- E-Yantra (www.e-yantra.org)- The e-Yantra is an initiative to spread education in embedded systems and robotics by IIT Bombay, sponsored by the Ministry of Human Resource & Development (MHRD). The objective of this project is to provide hands-on learning to engineering students who have limited access to labs and mentors. The goal is to create the next generation of (Embedded Systems) engineers in India with a practical outlook to take on challenging problems and provide solutions.
- Quantum & Nano Computing (www.dei.ac.in/dei/quantumNano)- The Quantum-Nano Centre is a multidisciplinary centre at Dayalbagh Educational Institute, Agra. The mission of this project is to aggressively explore and advance the application of quantum-nano systems to a vast array of relevant information processing techniques.
- Expert Database & National Researcher Network (vidwan.inflibnet.ac.in)-
- Indian Research Information Network System (irins.org/irins)-

Open Educational Resources-

- NPTEL (www.nptel.ac.in)-

- SWAYAM (www.swayam.gov.in)-
- NROER (www.nroer.gov.in)-
- Saylor Academy (www.saylor.org)-
- OER Commons (www.oercommons.org)-
- Khan Academy (www.khanacademy.org)-
- MIT BLOSSOMS (www.blossoms.mit.edu)-
- COL Virtual Learning (www.colvec.org)-
- Directory of OER (www.doer.col.org)-
- COL's Institutional Repository (www.oasis.col.org)-
- Virtual University of Pakistan (www.ocw.vu.edu.pk)-
- LabXchange (www.labxchange.org)-
- MIT Open CourseWare (www.ocw.mit.edu)-
- Lumen Courses (www.lumenlearning.com)-
- MERLOT- Online Learning Resources (www.merlot.org)-
- eCampus- Learning Resources (www.ecampusontario.ca)-
- Skills Commons (www.skillscommons.org)-

Quizzes/ Testing / Games-

- Book Widgets (www.bookwidgets)- Worksheets, simulations, games & more for use in classrooms and multi-touch books.
- Class kick (www.classkick.com)- Easy real-time feedback & formative assessment.
- Class marker (www.classmaker.com)- Easy online testing.
- Class tools (www.classtools.net) - Several class tools of any kind.
- DeckToys (<https://deck.toys>) - Drag-and-drop lesson creation, differentiate the right way, full control over your lesson delivery and tracking your progress in real-time.
- Educaplay (educaplay.com) - Create numerous interactive games with instant feedback.
- Flipgrid (<https://info.flipgrid.com>) - Create a Grid - that's your classroom or community. Add a Topic or two to spark the discussion. Your students share short video responses to ignite a dialogue. Super simple. Super powerful.
- Google Forms (<http://forms.google.com>)- Easy for quizzes, evaluations or questionnaires.

- Goosechase - Scavenger hunts for the masses. Bold, crazy, and highly addictive. Incredibly easy to use with all the power you could ever want.
- Gynzy - Gynzy is an online whiteboard helping teachers create engaging lessons plans to engage students in the classroom.
- H5P (www.h5p.org) - Create, share, and reuse interactive HTML5 content in your browser.
- Learnclick (www.learnclick.com) - Create online cloze quizzes. Simply mark words to turn them into gaps, dropdown or drag & drop quizzes.
- Poll Everywhere (www.polleveryone.com)- Live interactive audience participation. Engage your audience or class in real-time.
- Quizizz (www.quizizz.com) - Quizizz is a fun review tool that allows the entire class to practice together. It's completely free.
- SurveyMonkey (www.surveymonkey.com)- Create Surveys, Get Answers.

4.6 BRIEF OVERVIEW OF LEARNING MANAGEMENT SYSTEM

The Learning Management System (LMS) may be defined in the user perspective as a virtual environment that aims to simulate face-to-face learning environments with the use of Information Technology. In LMS, the interaction happens through devices that enable communication either synchronously or asynchronously allowing the creation of different strategies to encourage dialogue and active participation of students. Learning Management Systems are web-based systems that enable teachers and students to share materials, submit & return assignments, and to communicate online. The LMS, mediation involves both the acquisition of competences and communication skills for all the teachers and students as well as creation of interactive moments and practical application possibilities for collaborations. To establish such communication we used chat rooms, forums, blogs, video blogs, etc.

The LMS is enabled to integrate multiple media, different languages & resources while enabling alternative technologies and presenting information in an organized manner to fulfil its main purpose which is the construction of learning through interaction. The well-planned and designed courses perform the key role in teaching-learning using LMS, which is necessary for e-learning quality. There are several LMS (software) options available in the market including commercial or proprietary and free and open-source software. Some top rated LMS options are- BlackBoard (proprietary), Breeze, Moodle (Free and Open-source), plus dotLRN and the Sakai Project, etc.

In relation to quality standards in LMS, considering the development of information technology and the growing use of these LMS environments, the importance of identifying

those that comply with minimum requirements arises. These requirements can be expressed in terms of reliability, scalability, security, sustainability, and adoption of international standards of quality. Reliability can be obtained through the experience of large universities in using virtual fields for face-to-face or distance education. Scalability is needed to attend to the large numbers of students, a fundamental characteristic of e-learning. The adoption of international quality standards largely depends on the developer team and the options for meeting the needs and goals of users which can differentiate virtual environment.

4.7 POINTS TO REMEMBER

- The applications of ICT in our daily life have changed the ways individuals' access and elaborate knowledge.
- Individuals have to develop the right set of skills to make meaningful use of ICT in their life. Increasing use of digital technologies at work (especially in teaching learning) is raising the demand for new skill sets.
- Knowledge involves two components e.g.,' content and skills
- Most knowledge-based activities depend heavily on the use of information technology.
- Open education is education without academic admission requirements and is typically offered online. Open education broadens access to the learning and training traditionally offered through formal education systems.
- The open education is a collection of practices that utilize online technology to freely share knowledge.
- The Learning Management System (LMS) may be defined in the user perspective as a virtual environment that aims to simulate face-to-face learning environments with the use of Information Technology.

4.8 GLOSSARY

- LMS- Learning Management System.
- OLI- Open Learning initiatives.
- Knowledge Management- Knowledge is not only rapidly changing with new research, new developments and rapid dissemination of ideas and practices over the Internet but the sources of information are also increasing with a great deal of variability in the reliability or validity of the information.
- Communications Skills- With the traditional communication skills of reading, speaking and writing coherently and clearly, we need to add social media communication skills.

4.9 CHECK YOUR PROGRESS

Descriptive type questions-

- a) What do you understand by new-age learning skills? Explain.
- b) Explain Open Education.
- c) List five digital repositories for e-learning.
- d) Briefly explain the learning management system.

Objective type questions-

- a) LMS may be defined as a virtual environment that aims to simulate face-to-face learning environments with the use of Information Technology. (True/False)
- b) In LMS, the interaction happens through either synchronous communication or asynchronous communication. (True/False)
- c) The objective of the E-Yantra project is to provide hands-on learning to engineering students who have limited access to labs and mentors. (True/False)
- d) Virtual Labs project is a consortium activity of JNU and Delhi University to provide virtual practical experience. (True/False)
- e) Open education is a collection of practices that utilize online technology to freely share knowledge. (True/False)
- f) FOSSEE stands for Free Open-source Software for Enterprise. (True/False)
- g) A-VIEW is an indigenously built multi-modal, multimedia e-learning platform that provides an immersive e-learning experience. (True/False)

Answer (objective type questions)-

- [a] True [b] True [c] True [d] False
[e] True [f] False [g] True

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- https://en.wikipedia.org/wiki/Open_education
- <https://opentextbc.ca/teachinginadigitalage/chapter/section-1-3-the-skills-needed-in-a-digital-age/>
- https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-17752016000200157
- <https://www.todaysteachingtools.com/lijst-van-ict-tools.html>
- www.vlab.co.in (Virtual Labs).
- www.aview.in (Talk to Teacher).
- www.spoken-tutorial.org (Spoken Tutorial).

- www.cec.nic.in (Consortium for Educational Communication).
- www.e-yantra.org (E-Yantra).
- www.inflibnet.ac.in (Digital Library Inflibnet).
- www.dei.ac.in/dei/quantumNano (Quantum & Nano Computing).
- www.Fossee.in (Free Open-source Software for Education project).
- www.dsource.in (E-Kalpa).
- epgp.inflibnet.ac.in (E-PG Pathshala).
- vidwan.inflibnet.ac.in (Vidwan- Expert Database and National Researcher Network).
- irins.org/irins (Indian Research Information Network System).
- nroer.gov.in/welcome (National Repository of Open Educational Resources).

4.11 SUGGESTED READINGS

- <http://oasis.col.org/handle/11599/2447>
- Education for the 21st Century- Impact of ICT and Digital Resources, IFIP 19th World Computer Congress, TC-3 Education, August 21-24, 2006, Santiago, Chile, Editors: Kumar, Deepak, Turner, Joe (Eds.)
- https://docs.moodle.org/39/en/Main_page
- <https://opentextbc.ca/teachinginadigitalage/chapter/section-1-3-the-skills-needed-in-a-digital-age/>

UNIT- 5

INTRODUCTION TO TECHNOLOGY ENABLED EDUCATION- I & II

5.1	INTRODUCTION
5.2	OBJECTIVES
5.3	ROLE AND IMPORTANCE OF TECHNOLOGY ENABLED EDUCATION FOR EFFECTIVE LEARNING AND TEACHING
5.4	USE OF TECHNOLOGY FOR EFFECTIVE COMMUNICATION BETWEEN TEACHERS, PARENTS AND STUDENTS
5.5	TECHNOLOGY ENABLED EDUCATION (TEE) APPLICATION
5.6	VIRTUAL CLASSROOM
5.7	BLOGS
5.8	LESSON ON DEMAND
5.9	VIRTUAL UNIVERSITY
5.10	FUTURE PROSPECTS OF TECHNOLOGY ENABLED EDUCATION
5.11	IMPORTANCE OF TECHNOLOGY ENABLED EDUCATION
5.12	INTERNET AND E-LEARNING
5.13	GOVERNMENT INITIATIVE FOR TECHNOLOGY ENABLED LEARNING
5.14	NATIONAL KNOWLEDGE NETWORK (NKN)
5.15	E-REPOSITORY TOOLS
5.16	ROLE OF TECHNOLOGY ENABLED EDUCATION IN QUALITY EDUCATION
5.17	POINTS TO REMEMBER
5.18	GLOSSARY
5.19	CHECK YOUR PROGRESS
5.20	BIBLIOGRAPHY/ REFERENCES
5.21	SUGGESTED READINGS

5.1 INTRODUCTION

The use of Information Technology (IT) and Computer Science is increasing day by day. Almost every part of our life is benefitted by its use. Technological progress can be hitch up for increasing both expansion and quality of education [1].

The 'Technology Enabled Learning' sometime known as 'E-mastering' is a teaching format which merges lectures, simulations and hands-on desktop experiments to develop an advanced collaborative learning experience. Its goal is to inspire the emergence of new way of teaching which can be sustained by context-conscious use of time and anchored within the practices of readers.[2]

- Collaborative learning- Students working during class in small groups with shared desktop/laptop computers.
- Desktop experiments with data acquisition links.
- Media-rich visualizations and simulations delivered via laptops, desktop and the Internet.
- Personal response systems that stimulate interaction between students and Teachers. [4, 25]

The Information Technology (IT) has become a major part of everyone's, due to technological progress it is very important to provide quality education. It is also essential to develop infrastructure and network for technology enabled education in institutes of higher education. The digital resource should be developed and utilized for quality certified programmes and courses for universities and other educational institutions.

Government of India in 2009, launched its National Mission on Education through Information and Communication Technology (NMEICT) providing an excellent opportunity for teachers and experts in the country to provide their collective wisdom for the benefit of every learner. This mission is also important to maintain a high growth rate of our economy by capacity building and knowledge empowerment of people. It will helpful for promoting new, upcoming multi-disciplinary fields of knowledge. Finally, we can say that the Technology Enabled Education is the future.

It is always said that 'Knowledge is power' and education is one of the best tools to bring equality in this world. Education helps us to earn livelihood and get a sense of understanding. Education brings the quality of life. It also enhances the power of thinking, imagination, creativity, and helps us see beyond the obvious [R2- 1]. Government always believe that education is for everyone. Unfortunately, the access to quality education or learning is still far away from the millions of people. In order to cater the problem technology-enabled education is an urgent need which may help the spread of quality education to each and every corner of the country through Information Communication Technology.

Education in India should not be confined to urban areas but must reach to the last mile learner. Statistics suggest that most of the schools are located in rural areas [R2- 2]. Lack of proper infrastructure and accessibility of information is the biggest challenge for these school. Very few private schools move towards rural area to open their branches or new unit. Though in recent years, government initiatives, private, and personal efforts are bringing tremendous changes. With the advent of Information Technology (IT) as an essential part of our life, education is also changing. Smart classrooms, online education, virtual universities are few glimpses of the change. We are in the age, where global education hubs are at our fingertips and easily choose degrees, courses, contents, teachers and timings anytime as desired.

The main objective of Technology-enabled Education is to provide quality education at the door steps of the common man. This Information Communication Technology based education is more focused on the upliftment of rural community [R2- 3]. In nutshell, it is “Integrated Development of Education and Economic Empowerment for Rural Students”. The paradigm shift of traditional education to technology-based education offers several benefits like:

Accessibility to Education- Before Information Communication Technology (ICT), it was difficult to spread or access the information especially in urban and rural areas. But, now with the help of Technology Enabled Education the accessibility of education has become more viable.

Learning at your own pace- Due to many technological developments, better infrastructure, quality services and communication is making way for the user to have education at their ease. The Internet, mobile technology, virtual classrooms are providing more options for the users to access information and learning resources anywhere and anytime.

We have learnt that e-learning is an important mechanism through which we can enhance our knowledge irrespective of time, place, university and course. There are many options available for all knowledge seekers as many virtual universities are making their mark in the market. The easy accessible knowledge is supported by various e-learning tools like Wiki-university, NPTEL, Spoken tutorial, Brihaspati. Most of them are Open-source, user-friendly and offer technical support which makes them more effective and easier to use. We must use these tools to enhance our knowledge and to get up-to-date with the ever-changing technology of today.

5.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define the role and importance of Technology Enabled Education for effective teaching learning.

- Understand the use of Technology for effective communication between teachers, parents and students.
- Define Internet and E-Learning.
- Know about Govt. initiatives for Technology Enabled Education and the National Knowledge Network.
- Define the applications of Technology Enabled Education, e.g., ' Virtual Classroom, Blogs, Lesson on Demand, Virtual University, etc.
- Know success stories of Technology Enabled Education, e.g., ' NPTEL, YouTube video Channels, etc.
- Understand importance and the prospects of Technology-Enabled Education.

ROLE AND IMPORTANCE OF TECHNOLOGY 5.3 ENABLED EDUCATION FOR EFFECTIVE LEARNING AND TEACHING

We can experience and understand the transformative energy of a competent instructor. If we were particularly lucky, we would have had excellent teachers who made class an interesting place. Those teachers who possessed an ardour for the topics that they taught. They took actual care of the scholars whom they taught. They always motivate us to play with thoughts, suppose deeply about the situation matter. They also tackle challenging work and even pursue careers in a particular area. Few brilliant teachers achieve celeb popularity. However, many of students do not get success because their understanding is not good with teachers or do not match with their teacher. It shows the importance of understanding with teachers [25].

This is the value of the teacher, who looks at a face and says there's something behind that. I want to reach that person, I want to influence that person, I want to encourage that person, I want to enrich, I want to call out that person who is behind that face, behind that color, behind that language, behind that tradition, behind that culture. I believe you can do it. I know what was done for me [6].

-Maya Angelou

Teaching and learning, is not as smooth as we assume. It doesn't mean only giving facts or assigning homework. Constructing, engaging & linked study room environment and healthy student-trainer relation calls for continuous and powerful communication. In this virtual age, teachers want to examine the artwork of interacting and speaking with the student effective for effective communication and understanding [25].

Educators ought to be skilled in listening and understanding thoughts and concepts of their students. They should be able to elaborating things clearly. Educators' want's clarity in communication. They always scold their student for good and clear communication. They ought to be able to break down complicated ideas into simpler, straightforward steps.

Educators should be able to read and understand their student's mind. Effective communication includes changing an uneventful spoken communication into a smart and equally fascinating presentation [25].

Sometimes, a teacher who is keen to understand their students will make an attempt to learn their name. He will try to call them with their name. A teacher invariably attempts to perceive his student's dream, biggest concerns, hopes and preferences, which plays a significant role in effective and continuous communication. Academicians should celebrate their student's successes. Acknowledging the work of students may be an excellent way to positive impact on their learning highlighting their strengths [25].

5.4 USE OF TECHNOLOGY FOR EFFECTIVE COMMUNICATION BETWEEN TEACHERS, PARENTS AND STUDENTS

Nowadays, we use phone calls, emails, newsletters, e-cards, chat applications, video conferencing for sharing any information from one place to another place. Use of technology is faster making communication effective and straightforward. There are a variety of applications and platforms that change teacher-student & parent communication [25].

It is very important to use tools for educators, students and others. Education through the web, network or standalone laptop is easy and helpful. E-learning is actually a network-enabled transfer of education, skills and data. E-learning refers to the process of receiving knowledge through electronic means or applications. E-learning applications and process embraces web-based learning, computer-based learning, virtual lecture rooms and digital collaboration. Content is delivered via web, intranet/extranet, audio or video tape, television system and CD-ROM [25]. E-learning was called "Internet-Based training" in the beginning, but now is addressed as "Web-Based Training" [8].

5.5 TECHNOLOGY ENABLED EDUCATION (TEE) APPLICATION

The application of Information Communication Technology in education can help students to compete in the ever-changing global economy. It will also help create skilled workforce. TEE helps facilitate social mobility by:

- Technology-enabled education enhances learning experiences and provides new sets of skills.
- Reaches more students with Massive Open Online Courses (MOOCs).
- Facilitates and train the faculties.
- Minimises costs of education.
- Saves time associated with information delivery and automating regular day-to-day tasks.

- Improves administration of institutions to enhance the quality and efficiency of service delivery.
- Enables Technology-enabled education in institutions which is essential for NAAC, NBA, and ABET accreditations.

Improving the quality of education is to make use of efficient technology i.e. through Technology-Enabled Education which facilitates learning without time constraints. It's also helpful to conduct assessments and generate reports. This new tool of education will open up more opportunities for the teachers as well as for students for flexible and smoother learning. It also facilitates better results, and the accreditations too. Virtual University and virtual classroom are many more application of Technology-Enabled Education.

5.6 VIRTUAL CLASSROOM

Virtual Classroom is classroom connected by Internet providing communication environment for distance learners. It is just like conventional face-to-face classroom [4]. A virtual classroom allows learners to attend a class from anywhere in the world. It aims to provide a learning experience similar to a real classroom. Usually in virtual classrooms, classes are conducted through the NPTEL videos or by conducting workshop and modular program through SKYPE, etc.

Advantage of Virtual Classroom-

- No geographical barriers mean any student can learn from anywhere.
- Virtual Classroom supports instructor and learner to participate in live context, discussion.
- Virtual Classroom provides the look and feel of the real class.
- It provides support to communicate with one another.
- In virtual classroom along with chat, sharing of presentations, images and video is also possible.
- Group discussions and sharing of thoughts is also possible in a big group.

- Recording of lectures in audio and video formats is useful for students to understand subjects in as many times through available media.

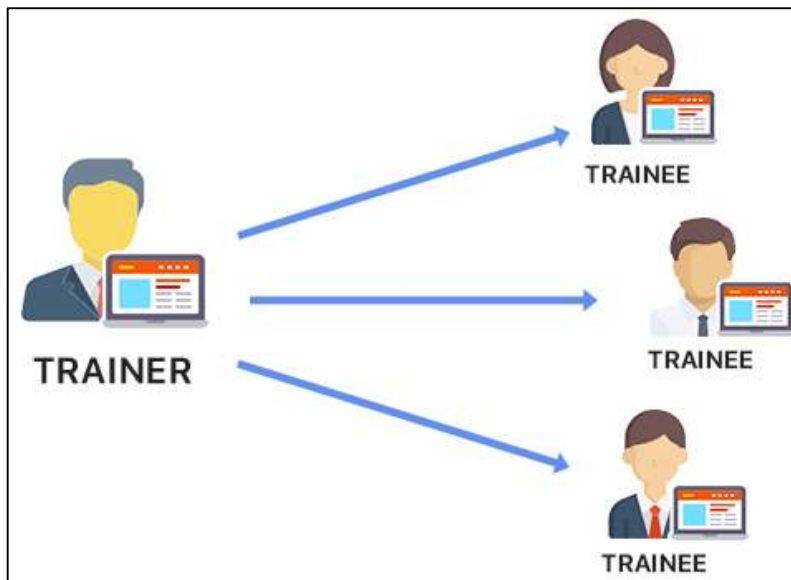


Figure 5.1 Model of Virtual Classroom

5.7 BLOGS

Blogging is basically an online journal to express your views and ideas. It is a novel way through which you can reach out to millions. There are many common blogs like WordPress, BlogSpot that cover all the dimensions of lifestyle, understanding subjects, sports, personality, youth, business, job, career guidance, psychological counselling, guidance, motivation, and much more. Popular blogs one must read, are- Digital inspiration, your story, Tech 2, Shout me loud, Save delete, Next big what, and many more.

Celebrities like Amitabh Bacchan, Karan Johar writes on regular basis. Tech-savvy people like Mohan Babu (Infosys), Vineet Naiyyar (HCL), Ajit Balakrishnan (Rediff.com), Hrush Bhatt (Cleartrip) are also make their digital presence through blogs. Popular writers like Chetan Bhagat, Meenakshi, Nandita, and D Kunal Goel also have their blogs. Swim India, Jammy, Sportsnob, Chinaman are some popular blogs in Sports segment. There are many ways to become famous and so are the ways to get acknowledged by the society. It could be any discipline however; one has to work hard to achieve success. There are many important benefits one can have while writing a blog-

- The blog is creative, innovative and expressive. So, blogs give us the way to learn new things, subjects and domains.
- We often find people who are searching for answers but still not able to get the right answer. So, if you write a blog, you might easily get solutions to many problems that others may be facing.

- We often search a place where we can share our versions of thoughts, sentiments, and emotions. Blog is the right place to express without hesitation and fear.
- Blog is the best way to build up your own brand. You can be subject expert, knowledge treatise or powerhouse of a particular subject. While expressing continuous on any topic, you can become maestro of the same and this will give you a perfect brand image.
- The world is full of dynamic, charismatic and energetic people. Blog opens up ways through which one can be part of a big society, country or world. It can help you to meet new and interesting people.

Therefore, blogging is one of the best ways to get to others in term of knowledge, idea sharing, researches, finding or expressing the self in terms of politics, sports, life style and other important segments of life.

5.8 LESSON ON DEMAND

Lesson on demand has recently become a popular tool for e-learning on virtual space. There is always a demand for lessons in different forms. Whenever, we need some information on life style, livelihood, essays, dissertations, thesis, we need lessons. There are certain third parties in the market that provide solutions to these issues. Lesson on Demand is becoming popular by day as one is running short of time to write or may not have the competency to deliver on time. The search for lesson on demand becomes a popular option to turn to and companies provide the same for a cost.

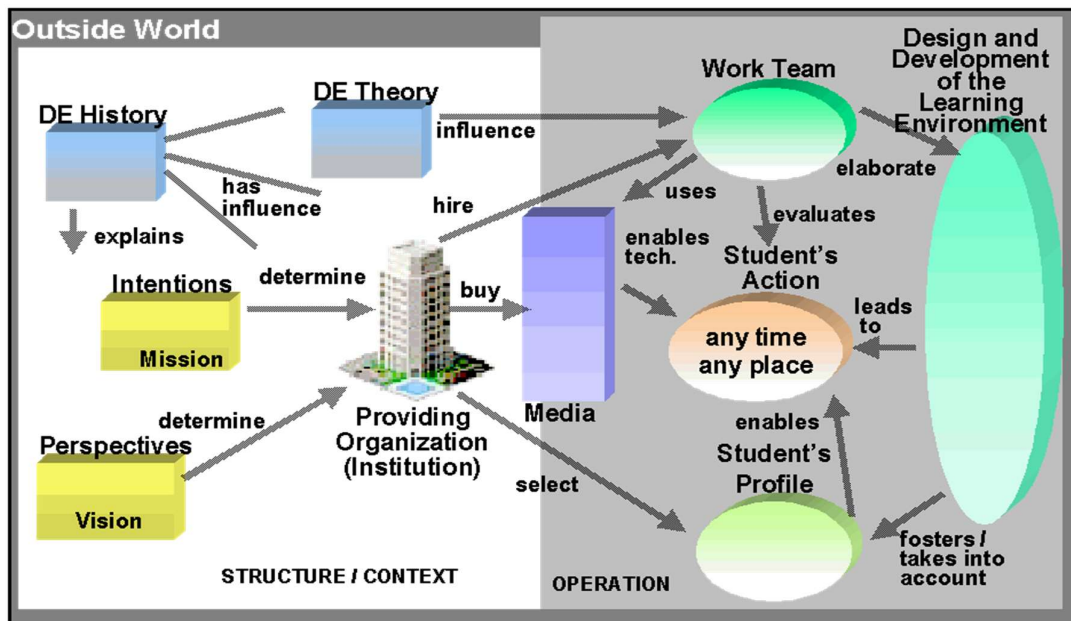
Many popular sites are available in the virtual world. These companies are making millions through lesson on demands while some of them are doing it free RISE (Roots in Science and Engineering), Associate university etc. are its example. They are providing free of charge lesson on demand.

5.9 VIRTUAL UNIVERSITY

Today internet has emerged as a big player providing reliable and easy communication among students and teachers which further provided the space for a virtual university environment. Technology-based education on high-end platforms has brought a revolution by providing round-the-clock classes, 365 days admission, and no time dependency [5].

Virtual university concept is booming in the education sector. In lieu of traditional knowledge or conventional pattern of education people are shifting towards non-conventional education like online education. It is a boon for the working class who have had to leave their education because of family problems or other reasons. Such people can join these virtual universities to continue or resume their education and to acquire more skills that will help with better job opportunities. Moreover, it also helps in improving the literacy rate of the country.

In brief, we can say virtual university is like a multimedia learning environment on networks. Virtual university is more comfortable than our conventional method of learning. Software like Skype are highly effective on networks used for receiving and delivering information. Interestingly we can find a number of courses in these virtual universities like regular curriculum degrees to non-conventional certificates and diplomas. It also helps the students



enhance their skills in both personal and professional environment [6].

Figure 5.2 Virtual University Model (Source: www.oocities.org)

The figure 2.2 clearly depicts that virtual university is delivering all the virtues of a regular university, rather the advantage is that the student is learning at their own pace also the university is delivering the contents as and when wished by the student. Work team is occupied in developing the quality contents along with delivery of the same into the user perspective like language, level and quality of the contents [7]. It is helping the students to gain knowledge in a similar environment as of traditional classrooms with their own level of understanding and pace [8].

Advantage of Virtual University-

- It removes geographical barriers and allows students to learn from anywhere.
- It is collaborative learning and allows students to learn in cross culture environment.
- It provides flexible study environment and benefits learning anytime, and anywhere. Now, learning is no longer location dependent and learners are able to take courses independent of their physical location.
- Content presentation can be customized according to each student needs in Virtual University. Similarly, differing teaching styles can be easily adopted. Overall, it

provides both teacher and learner a platform to present and learn according to their comfort zone.

- It is Cost effective as income of the lower class is generally low. The lower class can't afford an expensive education for their children or themselves. In such a scenario, Information Communication Technology provide a golden platform for them to learn and present their ideas. E-learning and virtual university environments are less expensive to produce and distribute the content, resulting in a higher degree of cost effectiveness and cost reduction. Its cost can be reduced through resource sharing, reduced travelling cost, etc.

You can easily register over on virtual university with limited fees after which you can find your schedule for classes.

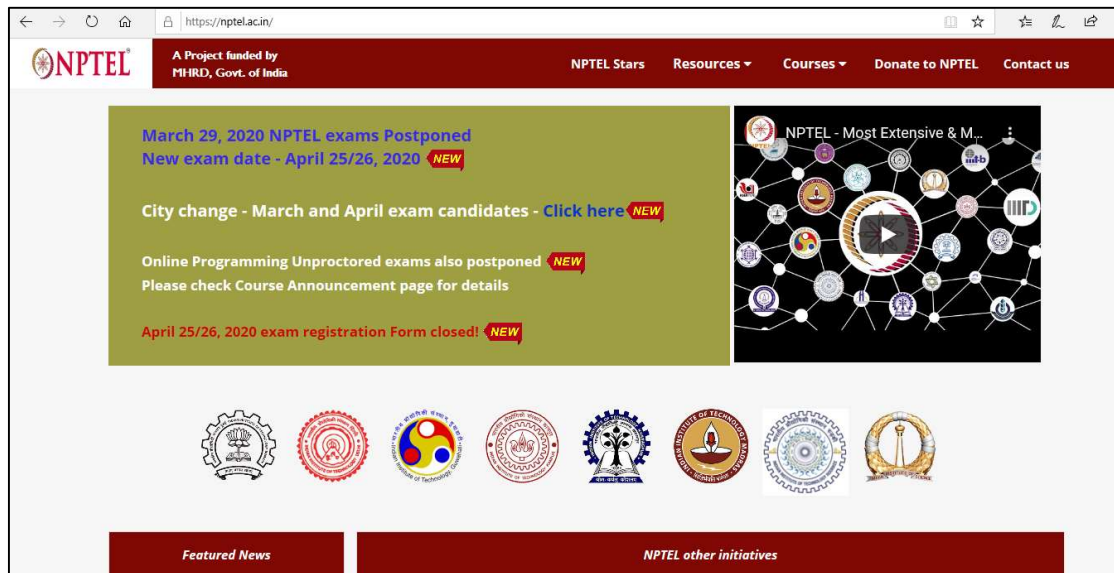
Traditional vs. Virtual University

Virtual/Online universities and traditional university both have same goal. They provide good opportunity to learn something which enables them to grow in their chosen field and not only earn a degree but also implement their learning in real time. Although their purpose is the same, both having some notable differences in the approach they take, making them distinctly apart.

Traditional University	Virtual University
In conventional university we have predefined class schedule.	In virtual university students can manage classes on their own.
In conventional university every day you need to cover some distance to attend the classes.	In virtual university you can attend your lecture or classes from home.
Traditional university is good for students who want to complete their degree on regular basis.	If somebody wants to pursue their degree while doing job then virtual university is better option for them.
You need to pay high prices for some courses in traditional university like MBA, MCA and other professional courses.	You can complete any professional course at very low prices through virtual university and shape your career.
In traditional university you have very limited option to learn any subject because the university may have two or three experts of that subject.	In virtual university you have better understanding regarding subject because you have a higher number of experts.
Students always refrain from using technology.	Students will have a higher level of computer literacy than students in traditional universities.

Following are some success stories or case studies of virtual universities-

NPTEL- National Programme for Technology Enabled Learning is a great initiative of Government of India, a joint venture of IIT and IIMs in collaborative efforts of the Ministry of Human Resources Development. One can access the NPTEL through its website i.e. www.nptel.ac.in. Interestingly, it has 995 + courses, 292 million pages is popularly getting into 12 odd countries. The site is having 19498 videos more than 5 lakhs subscribers more than 171 million view across the globe showing its popularity [9]. There are more than 3200 colleges having NPTEL local chapters. NPTEL videos are available on YouTube as well.



The web link is <https://www.YouTube.com/user/nptelhrd>.

Figure 5.3 NPTEL website home page (Source: www.nptel.ac.in)

The popular courses related to the following areas are available on the NPTEL, as- Aeronautical engineering, Agriculture, Automobile engineering, Biotechnology, Chemical engineering, Civil engineering, Computer engineering, Environmental science, General courses, Humanities, Management, Ocean, Physics, Textile engineering, etc.

NROER- National Repository on Open Educational Resources is another initiative of the government. The basic objective of NROER is to provide digital resources to students and teachers of the country. It is also aimed at providing participation of the community in development and sharing of digital resources. The major objective was to improve the quality and standardize education. NROER also helps teachers create and share contextual learning and teaching resources. Following are some features of NROER:

- NROER is on open access so that everyone can access the digital resources.
- There is absolutely no charge for using and sharing of information.
- There is no need to search for contents on various websites or pages as all resources are stored in one place.

- NROER offers resources for all subjects in multiple languages.
- These resources can be added to the NROER pool through proper channel. One can find this NROER on <http://nroer.gov.in/welcome>

YouTube- It is one of the most popular video sharing websites in the world owned by the Google incorporation. This website is very popular among audiences because of millions of videos covering each aspect be it lifestyle, entertainment, education, knowledge sharing experiences, TV shows, music, movies, etc. One can post their video on YouTube channels and share with family, friends or with the global community. Videos can also be viewed online or offline. The download facility of the YouTube makes it more popular. There are millions of videos which are available for free download. This can be found on www.YouTube.com

Spoken Tutorial- It is an initiative of National Mission on Education, Govt. of India through ICT (NMEICT). It is a rather friendly forum for online discussion registration to the forum is completely free and hardly takes a few minutes to get registered. With the initiative from IIT Mumbai, this program is quite popular in the educational institutions across the country. It provides services on many fronts like you attach files to your post's directly from your computer.



Figure 5.4 Spoken Tutorial Project Website home page (Source: www.spoken-tutorial.org)

You can give links to webpages or videos from other video websites. One can get the free training of popular programming software's like Linux, Scilab, LaTeX, PHP & MySQL, Java, and C/C++ on spoken tutorial. Spoken tutorial also has provision of online test. Online test is another interesting feature that gives the student's confidence, practice and also certificates on successful completion of the programs.

Wiki University- Commonly called Wikiversity offering more than 20 international languages like French, German, Dutch, Italian, Russian, Portuguese etc is a knowledge platform with the most popular e-Learning platform. The common Wiki products are Wikipedia, Wiktionary, Wikinews, Wikiquotes, Wikibooks, Wikidata, Wikispecies, Wikisources, Wikivoyages, Mediwiki, Metawiki shows the popularity of this eLearning source. With more than 22,000 eLearning resources, there are various schools, portals, courses, learning projects available for the students. The hand-on experience session, counsellor support makes this university more popular among working professionals.

TED Talks- It stands for ‘Technology, Entertainment and Design Talks.’ and is currently quite popular in enhancing knowledge in E-learning mechanism. Usually, the TED talks are confined to 15-18 minutes only. The energetic and enthusiastic speakers on this talk show speak on a noble idea supported with suitable evidences to draw the attention of academicians and students globally. The topic covers a range of subjects from science to business, technology to global issues. Moreover, these talks are conducted in more than 100 languages. This only makes TED talks a popular medium for academicians and the intelligentsia.

5.10 FUTURE PROSPECTS OF TECHNOLOGY ENABLED EDUCATION

The future of technology in education is that it changes at a fast pace. Today, we have iPads and other mobile technology. They are playing very important role in the future. Four years ago, iPad didn't exist and we don't know what new technology may come up in next four years. We have other devices like wearable devices such as Google Glass, tablets etc. These devices are frequently used in education.

The main factor of future education is access, anywhere learning and collaboration, locally/globally. In future, teaching and learning will be social. Schools of the future could be traditional cohort of students, as well as online. It could be available to the students across the country or even the world. Things are moving this direction. For example, OER, massive open online courses (MOOCs), Virtual University etc.

Cloud is going to be very important part of education technology. The future schools, will not need software installed, servers or local file storage. Schools will need a fast-robust internet connection, everything will be on cloud. Infrastructure is paramount to the future of technology in education. Teachers can use cloud to set, collect, and grade work online. Students will have instant access to grades, comments. They can work via a computer, smartphone or tablet. Many universities and schools are already doing this.

Now, school classrooms are going to change due to cloud and mobile devices. Technology will be integrated into every part of school where teachers, students, and support staff all will be connected. In future, all classrooms will be paperless with cloud, the whole world will be

our classroom. E-learning will drastically change teaching and learning where students can learn from anywhere and teachers can teach from anywhere.

Teachers can adopt a flipped classroom approach in future where students will take ownership of their own learning. There could be videos, documents, audio podcasts or interactive images with all of these resources to be accessed via a student's computer, smartphone or tablet as long as student has an internet connection either via Wi-Fi, 3G, 4G or 5G.

5.11 IMPORTANCE OF TECHNOLOGY ENABLED EDUCATION

Technology- Enabled Learning tools and technology enable learner to develop effective self-directed learning skills. They can identify what they need to learn, learner can find online resources, problem at hand. Technology-Enabled Learning increases learner's efficiency and productivity. It is handy for learners who can explore open-ended questions with imagination and logic learn how to make decisions, as opposed to just temporarily memorizing the textbook [R2- 9].

Learner has positive feelings of digitized learning tools and it gives them the confidence. They get motivate to learn even more new things. The millions of courses of the best educators are available for free to anyone with internet connection with endless possibilities. Digital Learning makes learner self-motivated and more accountable. Both trainer and learner using digital learning tools and technology become more engaged in growing their knowledge base, teamwork, problem-solving, reverse teaching, gamification [R2- 9].

Technology-Enabled Education and digital learning is more interactive than textbooks or one-sided lectures, and more engaging activities than traditional education methods. This allows students to better connect with the learning material. TEE and Digital Learning Tools involve educators and parents to a deeper extent, digital learning tools and technology is expected to rapidly increase information sharing [R2- 9].

Technology-Enabled Learning enable educators to rapidly share information with other educators in real-time. The explosion of free and open content and tools has created an environment of sharing. By connected learning, classrooms around the country and around the globe can not only coordinate with one another to share insights but also boost learning, experience, and communications skills [R2- 9].

Technology enabled learning enable increasing student's employability with digital learning tools and technology. It has replaced the traditional education methods. The traditional lectures may still exist along with the new-age learning tools and technology, but lecture materials should be provided as a supplement to classroom activities and moved online for students to reference outside the classroom [R2- 9].

Issues and Challenges in implementing Technology Enabled Education in India-

The biggest challenge to provide ICT-based education in India is how latest technology trends can shape education in future. In a developing country like India, lack of education technology, internet access, and qualified teachers are the biggest challenges in providing ICT-based educational services, especially to the rural area. The rate of internet penetration in the country, especially in the remote corners of India is the biggest challenge of Technology-Enabled Education. The shortage of technical equipment and eligible teachers is another challenge. However, in the coming few years, the scenario of e-learning will take a complete 360 degree turn in the country, especially in remote areas.

The importance of technology-enabled education is measured on the basis of the outcome of learning. Following are some key important points:

- We can examine different models of integrating technology for learning & teaching through technology-enabled education
- Learner can redefine Technology Enabled (Enhanced) Learning (TEL)
- Outline an overview of TEL environment as per learner's ease.
- Learner can identify current trends & prospective developments of the TEL
- TEL can give success stories/visual case studies & help self-reflect which is very beneficial for learner [7].

In this era, Internet is a vital part of our day to day life; anyone can connect throughout the world [25].

5.12 INTERNET AND E-LEARNING

Internet-

Internet is an interconnected computer network that uses the (TCP/IP) to link number of computers/devices worldwide. It is the network of networks that consists millions of private, public, academic, business and government networks of local as well as global, linked by a broad array of electronic, wireless, and optical networking technologies. Internet carries a wide range of information resources and services such as the inter-linked hypertext documents, applications of World Wide Web (www), electronic mail, telephony, and peer-to-peer networks for file sharing. Last two decades since 1995, Internet use has grown 100 times covering one third of the world population in a year [9].

E-Learning-

Educational technology is referred by the Association for Educational Communications and Technology as "the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and

resources. It refers to the use of both physical hardware and educational theoretic [11]. Following are some facts about E-Learning [25].

- E-learning is an extremely wide term. It includes all web-based training.
- Open Universities started utilizing a web-based conferencing framework as a learning tool around late 80s. Now, these university offers entire degree courses on web. Since 2000, the web has been also utilized by schools and colleges as a method for disseminating various media materials and course documentation [25].
- E-learning can be disseminated through various means. The non-benefit Khan Academy is a bank of free video addresses by prominent scholars though progressive programming stages, for example, Blackboard and Canvas permit educators and understudies to interface all the more adequately on web. MOOC's (Massive Online Open Courses) are extensively popular free and easily accessible short online courses offered by main colleges [25].
- MOOC's are free and can possibly be lucrative. America's most popular MOOC system, 'Coursera' offers courses from thousands of colleges around the world. These courses are genuine and free, one can ask for certifications after successful completing course and payment.
- The British version to Coursera, Future learns, offers courses from more than half of the hundreds of best UK colleges.
- Today not all e-learning courses are free. In some colleges, MOOC authentications are traded for genuine school credit which is very profitable for the employment market. Full degree capabilities stay accessible just to the paying understudy.
- MOOC's offer tutorials that are easy to understand. It is very helpful for students of educated and developed background.
- Data collected from e-learners is priceless. Significant number of learners and teachers use e-learning for lectures, test, apps, courses on web platforms. It is represented by the "Learning Analytics". It can be handy data source for the teachers [12, 25].

5.13 GOVERNMENT INITIATIVE FOR TECHNOLOGY ENABLED LEARNING

Albert Einstein once said that " Education is what remains after one has forgotten, what one has learned in the school." Unlike, the conventional classroom model, instruction today has transformed into discovering into instant, effective, and self- propelled learning etiquette. The use of e-learning has navigated the limits of school and school training to saturate the whole learning range, including web-based training for examinations [25].

NPTEL, gives E-learning through online Web and Video courses on engineering, science and humanities streams. The mission of NPTEL is to upgrade the nature of engineering

instruction through free online courseware in India [25]. Following are some government initiatives for technology-enabled learning:

- The purpose of Virtual Labs is to give remote-access to labs in different courses of science and engineering. These Virtual Labs are for undergraduates, post graduate students, and research scholars.
- Spoken Tutorial is the activity of 'Converse with a Teacher' of National Mission on Education through Information and Communication Technology (NMEICT), launched by the Ministry of Human Resources and Development, Government of India. This project is run by IIT Mumbai [25].
- E-Yantra is an activity to introduce robotics in building instruction with the target of drawing in understudies and instructors through energizing hands-on utilization of math, software engineering and designing standards.
- UGC's Infonet Digital Library Consortium was launched in December, 2003 by Honourable Dr A P J Abdul Kalam, then President of India, in the wake of giving the Internet network to colleges in the year 2003, under the UGC-Infonet program.
- Venture Open-source Courseware Animations Repository (OSCAR) presents an archive of electronic intelligent movements. These learning module's traverse themes in science and mathematics at school level. Students and educators can view, run and download these learning modules.
- E-Kalpa is an initiative for making digital-learning environment for design supported by the Ministry of Human Resources, Government of India, as a component of the National Mission in Education through Information and Communication Technology (NMEICT).
- Virtual Learning Environment (VLE), is an online domain of e-assets, obliging few controls taught at undergraduate and postgraduate level. It is an activity of Institute of Life-Long Learning, University of Delhi, drawing from a few fruitful models, the multi-media intuitive substance stacked on Virtual Learning Environment (VLE) are classified order astute.
- Aakash Tablet / Educational Portal is a highly beneficial for educators in conducting workshops directed for a huge number of instructors at one place, utilizing a one-of-a-kind mix of innovation, and an inventive instructional method. Thousands of users have benefitted the viability of this methodology and of the subsequent open-source substance. Somehow, the students have also relived from the weight of their school bags [25].

5.14 NATIONAL KNOWLEDGE NETWORK (NKN)

National Knowledge Network is a multi-gigabit system. It brings together fast system spine for instructive establishments in India. The National Knowledge Network consists of an ultra-rapid CORE (products of 10 Gbit/s), complimented with a conveyance layer at suitable paces. The foundation at the Edge will interface with the National Knowledge Network consistently at rates of 1 Gbit/s or higher. The system is intended to bolster overlay-networks, dedicated Networks and Virtual Networks. Propelled applications in regions, for example, Health, Education, Science and Technology, Grid Computing, Bioinformatics, Agriculture and Governance will be an indispensable part of NKN. The whole system will consistently incorporate with worldwide academic groups at various gigabits every second speed [25].

National Knowledge Network (NKN) is the best-in-class multi-gigabit dish India system. It is a unified high-speed network backbone for education institutions in India. The motivation behind such an information system goes to the very centre of the nation's mission for building quality foundations with essential examination offices and making a pool of profoundly prepared experts. The NKN empowers researchers, scientists, and students from various foundations and different geologies to work intently to advance human improvement. [25].

National knowledge network (NKN) is planned as a Smart Ultra High Bandwidth. It flawlessly interconnects the main Scientific and Technological establishments that are seeking world-class innovative work. It is intrinsically proactive. It considers the necessities that may arise in close term and long haul. The remarkable components of the NKN are:

- Establishing connectivity for knowledge and data sharing.
- Enabling collaborative research in rising ranges, for example, Climate Modelling.
- Facilitating separation instruction in particular fields, for example, pharmaceutical, rising cutting-edge regions covering information bio-nano innovation, etc.
- Facilitating an ultra-fast e-administration spine for data sharing.

Major benefits of NKN system

- High level accessibility
- Robust and dependable availability
- High level scalability

The Administrations of NKN

- Generic Services- Domain Name System, Internet, Intranet, Network Management Views, email, Messaging Gateways, Caching Gateways, Web Hosting, Voice over IP, Multipoint Control Chapter (MCU) Services, Video Portals, SMS Gateway, Co-Location Services, Video Streaming, and so on [25].
- Common Services- Authentication Service, Shared Storage, email List Software Application (LISTSERV), EVO, Session Initiation Protocol (SIP), Collaboration Service, Content Delivery Service, International Collaborations with EU-India Grid,

Global Ring Network for Advanced Applications Development (GLORIAD) and so on [25].

- Special Services- Virtual Private Network Stitching services.

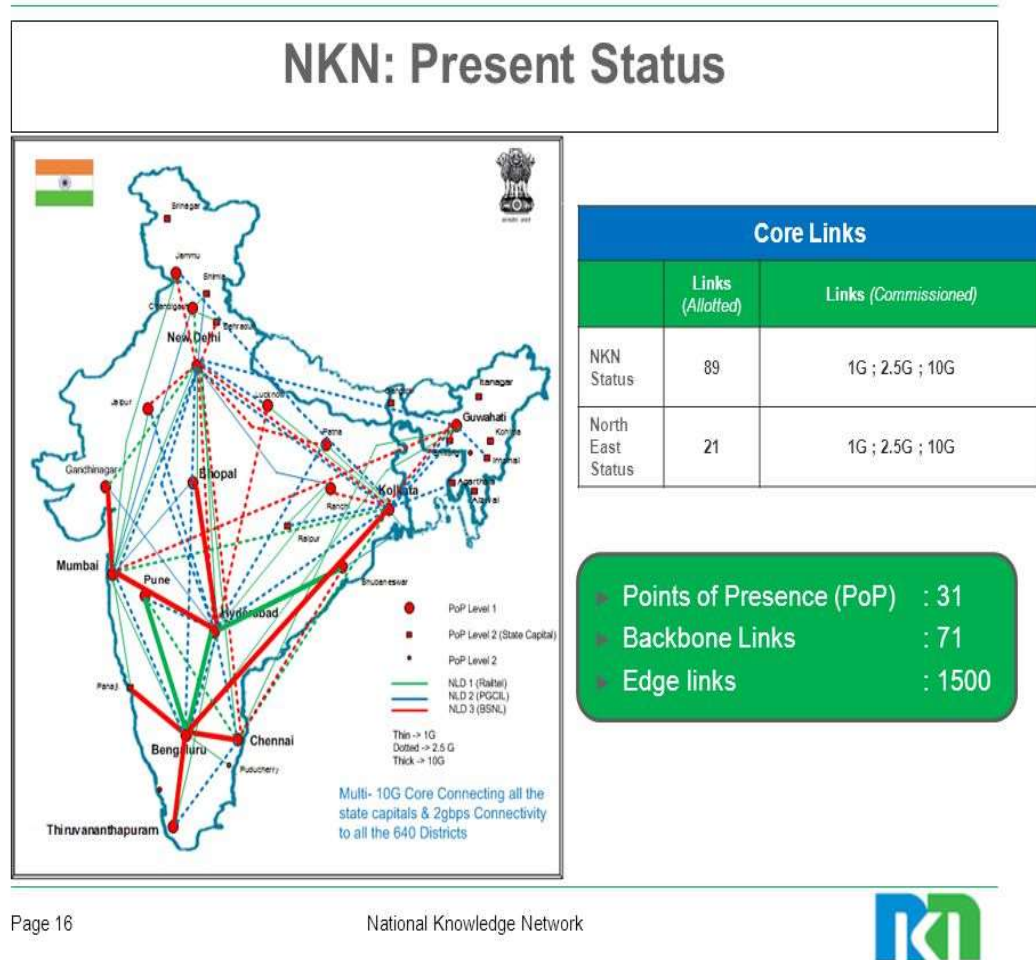


Figure 5.5 (Source: Appendix 1) Present status of National Knowledge Network

Higher learning and research with a fast information correspondence system encourages easily shareable learning and synergistic examination. It will fill the current information void in the nation and help India advance as a knowledge society and foster financial exercises in the Knowledge space [25]. The application ranges imagined, under the National Knowledge Network cover are-

- Agriculture
- Education
- Health
- E-administration
- Grid Computing
- High Performance Computing

Until 31st May 2014, there are 1261 connections to institutions have been charged and made operational under the initiative. This incorporates 341 connections to organizations under NMEICT, which have been relocated to NKN. 66 virtual classrooms have been set up. NKN availability has likewise been stretched out to 286 NIC regions focusses. 89 Nos of core links have been made operational and charged. NKN availability has been reached out to State Wide Area Network (SWAN) in 26 States/UTs and State Data Center (S, DC) in 23 States/UT's [25].

5.15 E-REPOSITORY TOOLS

E-Repository tools are an important and essential part of the technology-enabled learning. E-Repository is an effective and adaptable device for putting away, arranging, sharing, seeking and utilizing learning materials. It is an instrument to interoperability alternatives, empowering and securing computerized content techniques. It is at the heart of the technology-enabled learning. The E-Repository incorporates consistently with the E-Learning devices. E-Repository makes it simple for your library to safely convey copyright-cleared substance to your student and personnel [25].

The Digital Library gives you E-Repository framework. It empowers the organization to deal with all its computerized learning assets in one spot while making them accessible to the e-learning devices and various types of teaching and learning. This isolates the administration of assets from the administration of e-learning courses. The learning assets can be reports, mixed media courses, sites join, video address, gifts, presentations, worksheets, podcasts, video cuts, flash liveliness, and other straightforward articles. On the other hand, they can be more unpredictable reproductions, contextual analyses, intelligent modules or short courses which contain many documents and have different learning ways [25].

Digital book is a computerized book. This book comprises content, pictures, or both, discernible on PCs or other electronic devices. Although, at times characterized as "an electronic rendition of a printed book", numerous e-books exist with no printed proportional. Industrially created and sold, e-books are generally planned to be perused on devoted tablets. In any case, any modern electronic gadget that components a controllable survey screen, including PCs, tablets and cell phones can likewise be utilized to peruse e-books. These days, both print and in addition digital book offering is moving to the web. The fundamental reasons that individuals are purchasing books online are costs, comfort, and choice procedure. Despite, vast majority acknowledges higher general "blocks and mortar" bookshops, yet practically each one of us is purchasing books online". Based on this data, e-distribution will soon overwhelm the customary distribution [25].

E-books has numerous benefits in Technology-enabled learning. Following are some advantages and disadvantages of E-books-

Speed- E-books are very advantageous. You can buy a book specifically online. It shows up on your smart screen and you can read it any time. You can buy a book whenever, day or night. There are no shipping costs [25].

Capacity- E-books are very handy. Since one gadget can hold several books, when you travel you can take your whole library along and hold it in the palm of your hand. Any book that you have obtained online can undoubtedly be downloaded again so you never need to stress over losing a book, regardless of the fact that you lose your digital book per user [25].

Reading a digital book has certain focal points over using customary books. Instead of attempting to discover a paper book with huge content, you just make the content bigger on your gadget. You can change the textual style and the shade of the foundation in most gadgets as per your tastes. For instance, you can change to dark content on any suitable style or white content on dark foundation. With digital book, users you have your decision of e-ink per users like the first Kindle and Nook, or illuminated per users like the new Kindle Fire and other tablet-sort per users. E-ink book per users have no shading, yet they are less demanding on the eyes. Like customary books, they require outside lighting. They are awesome in brilliant sun yet require a light to read around evening time. Illuminated per users, similar to PC screens have shading capacities yet perusing on them is tiring for the eyes. Both Kindle and Nook, additionally have e-ink per users like the Kindle Paperwhite that are high contrast e-ink, however have their own inner lighting. The upside of a physical book here is that you don't need to stress over the sort of innovation [25].

PDF [16] refers to Portable Document Format. PDF is a record group created by Adobe Systems in 1992. PDF catches and organizes data from an assortment of desktop distributed applications, making it conceivable to send designed reports and have them show up on the beneficiary's screen or printer, as they were intended. This is on the grounds, that a PDF will keep up the first textual styles, pictures, representation and in addition, the precise format of the document [25].

To see a PDF record, you require Adobe Reader. It is a free application program circulated by Adobe Systems. Adobe likewise makes an Acrobat Plug-in for Web programs. It empowers PDF records to be seen inside a program window [25].

A PDF record can be shared, seen and printed by anybody utilizing free Adobe Reader programme, paying little attention to the working framework, unique outline application or text styles. The apparatuses to see and make PDF records, called Acrobat, was discharged in 1993. To see a record in PDF position, you require Adobe Reader, a free application circulated by Adobe Systems. At first, the apparatuses to make and view PDF's were costly. But later, Adobe propelled a free form of Acrobat Reader [25].

Today PDF is an open standard kept up by the International Organization for Standardization (ISO). The organization has expanded throughout the years and now PDF documents can

contain components including joins, structure fields, sound, and can be marked electronically to gather e-marks that are lawfully official. Access to PDF documents can be controlled with passwords and secured PDFs can be made in various office and efficiency applications. Following are the major features of PDF document:

- Graphic outline improvement for colleagues working at a different place with the need to investigate and plan thoughts online.
- Help work area individuals who need to see the printed book for clients.
- Online appropriation of any printed record in which you need to safeguard its printed appearance [25]

PDF records are upgraded for the Web by rendering content before realistic pictures and hypertext joins.

Microsoft Word is a word processor created by Microsoft. It was initially under the name Multi-Tool Word for Xenix systems. Subsequent adaptations were later composed for a few different stages including IBM PCs running DOS (1983), Apple Macintosh running Mac OS (1985), AT&T Unix PC (1985), Atari ST (1988), OS/2 (1989), Microsoft Windows (1989) and SCO Unix (1994). Business forms of Word are authorized as a standalone item or as a part of Microsoft Office, Windows RT or the stopped Microsoft Works suite. Microsoft Word Viewer and Office Online are Freeware versions of Word with restricted components [25].

Microsoft Word's local record arrangements are meant either by a .doc or .docx filename with extension. PPT [18] is a record expansion for a presentation document position utilized by Microsoft PowerPoint, the mainstream presentation programming ordinarily utilized for office and instructive slide appears. All content pictures, sound and video utilized as a part of the presentation are contained in the PPT document [25].

Microsoft PowerPoint is a slide show presentation program. It is created by Microsoft. PowerPoint is valuable for building up the slide-based presentation arrange, and is as of now a standout amongst the most usually utilized presentation programs accessible [25].

PPT is a document expansion for a presentation record group. It is utilized by Microsoft PowerPoint, the mainstream presentation programming regularly utilized for office and instructive slide appears. All content pictures, sound, and video utilized as a part of the presentation are contained in the PPT document. PPT records can be seen by PowerPoint, PowerPoint Viewer or the Open Office programming suite [25].

Online Reading is a way to read out articles on a laptop, mobile phone, and electronic gadgets. Internet is a major tool to find products we need. With more and more content going digital, now you don't have to go to a bookstore to preview the book before buying it [25].

Now, you only need a computer which is connected to the internet and also Internet browsers like Chrome, Safari, Firefox or Internet Explorer. Following are some services commonly used for Online Reading:

- Slide Share
- Shelfari
- DocStock
- Freado
- Publication etc.

Following are 10 different sites where you can read books online:

- Project Gutenberg
- Internet Archive
- Open Library
- Google Books
- Smash words
- Blurb
- Scribd
- Watt pad
- Bookish
- 24Symbols etc.

Online Publication [19] which is also known as e-publishing or digital publishing, includes digital publication of e-books, digital magazines. It is also used for development of digital libraries and catalogues [25].

It should be a regular practice to circulate books, magazines and daily papers to customers. The kindle, tablet, and other smart gadgets are very popular in now a day for online reading.

Electronic publishing and copyright laws are now custom-made for the printed books. Electronic distributed raises new inquiries in connection to copyright. Following are some electronic versions of traditional media [25]:

- CD-ROM
- E-book
- Electronic journal
- Online magazine
- Online newspaper
- PDF

Following are some new media which are commonly used at present [25]:

- Blog

- Collaborative software
- Digital publication app
- File sharing
- Mobile apps
- Podcast
- Enhanced publication

5.16 *ROLE OF TECHNOLOGY ENABLED EDUCATION IN QUALITY EDUCATION*

In this age of Fourth Industrial Revolution, it's clear that technology will play a key role. It will positively affect our lives. It's roughly estimated that by 2020 there will be million new digitised jobs across the globe. At the same time, the organisations will have IT skills shortage. The educators and students will feel that there is a gap in their ability to meet the skills needs of the Information Technology workforce. In order to prepare the workforce and talent required for the digital economy, the education must adapt as fast as the demand for Information Technology. The skills are now growing and evolving very rapidly. Finally analysing all these facts, we can understand the fact that the role of technology enabled education in quality education is crucial.

5.17 *POINTS TO REMEMBER*

- Through Technology Enabled Education, we can examine different models of integrating technology for learning & teaching.
- E-learning is actually a network-enabled transfer of education, skills and data. E-learning applications and processes embrace web-based learning, computer-based learning, virtual lecture rooms and digital collaboration. Content is delivered via web, intranet/extranet, audio or video tape, television system and CD-ROM.
- Internet is the network of networks that consists of millions of private, public, academic, business and government networks of local as well as global, linked by a broad array of electronic, wireless and optical networking technologies.
- In some colleges, MOOC authentications are traded for genuine school credit which is progressively profitable for the employment market.
- E-Yantra is an activity to introduce robotics into building instruction with the target of drawing in understudies and instructors through energizing hands-on utilization of math, software engineering and designing standards.
- Venture Open-source Courseware Animations Repository (OSCAR) presents an archive of electronic intelligent movements. These learning module's traverse themes

of science and mathematics at school levels. Students and educators can view, run and download these learning modules.

- Digital Library gives you E-Repository framework. It empowers the organization to deal with all its computerized learning assets in one spot while making them accessible to the e-learning devices and various types of teaching and learning.
- PDF is a free application program circulated by Adobe Systems. Adobe makes an Acrobat Plug-in for Web programs. It empowers PDF records to be seen inside a program window.
- Microsoft PowerPoint is a slide show presentation program created by Microsoft. PowerPoint is valuable for building up the slide-based presentation arrange and as of now a standout amongst the most usually utilized presentation programs accessible.
- Online Publication [19] also known as e-publishing or digital publishing includes the digital publication of e-books, digital magazines used for the development of digital libraries and catalogues.
- Knowledge is power and education is one of the best tools to bring equality in this world. Education helps us to earn livelihood, get a sense of understanding. Education brings the quality of life and enhances the power of thinking, imagination, creativity, and help us see beyond the obvious [R2- 1].
- The main objective of Technology-enabled education is to provide quality education at the door steps of common man. This Information Communication Technology based education is more focused to upliftment of rural community.
- Information Communication Technology in education can help students to compete in the global economy. It will also help create skilled workforce.
- In Virtual Classroom chat, sharing of presentations, images and video is possible. In Virtual Classroom the recording of the lectures in audio and video formats is useful for student to understand the subject in as many times through available media.
- A blog should be creative, innovative and expressive. So, blogs give us the way to learn new things, subjects and domains.
- We often find people searching for answers but still not able to get the right answer. So, if you write a blog, it can provide solution to many problems that others may be facing.
- We often search a place where we can share our versions of thoughts, sentiments, and emotions. The blog is a good place where one can express themselves without hesitation and fear.

- Blog is the best way to build up your own brand. You can be subject expert, knowledge treatise, or powerhouse of a particular subject. While expressing continuous on any topic, you can become maestro of the same and this will give you a perfect brand image.
- Blogging is one of the best ways to get to others in term of knowledge, idea sharing, researches, finding or expressing the self in terms of politics, sports, life style, and other popular segments of life.
- Virtual university concept is booming in the education sector in lieu of traditional knowledge or conventional pattern of education, people are shifting towards non-conventional education like online education.
- Advantage of virtual university is that the student is learning at their own pace. The university is delivering contents as and when wished for by the student.
- One can post their video on YouTube channels and share with family, friends or with the global community. Videos can also be viewed online or offline. There are millions of videos which are available for free download. This can be found on www.YouTube.com

5.18 GLOSSARY

- Collaborative learning- Students working during class in small groups with shared desktop/laptop computers.
- E-learning- referred to as "Internet-Based training" in the beginning and is now addressed as "Web-Based Training".
- NPTEL- gives E-learning through online Web and Video courses in Engineering, Science and Humanities streams. The mission of NPTEL is to upgrade the nature of engineering instruction in the nation by giving free online courseware.
- Spoken Tutorial is an online courseware under (NMEICT) National Mission on Education through Information and Communication Technology, launched by the Ministry of Human Resources and Development, Government of India. This project is run by IIT Mumbai.
- UGC's Infonet Digital Library Consortium launched in December 2003 by Honourable Dr A P J Abdul Kalam, then President of India, in the wake of giving the Internet network to colleges, under the UGC-Infonet program.
- National knowledge network (NKN)- It flawlessly interconnects the main Scientific and Technological establishments that are seeking world-class innovative work.
- E-Repository- is an important and essential part of the Technology Enabled Learning. E-Repository is an effective and adaptable device for putting away, arranging, sharing,

seeking and utilizing learning materials. The E-Repository incorporates consistently with the E-Learning devices.

- Digital book- is a computerized book comprising content, pictures, or both, discernible on PCs or other electronic devices.
- Virtual Classroom - is a kind of classroom connected through Internet where we get technology-enabled Education. It provides a communication environment for distance learners. It is just like conventional face-to-face classroom. A virtual classroom allows learners to attend a class from anywhere in the world.
- Blogging - is an online journal where you can express your views and ideas. It is a novel way through to reach out millions. There are many common blogs like WordPress, BlogSpot that cover all the dimensions of lifestyle, understanding the subjects, sports, personality, youth, business, job, career guidance, psychological counselling, guidance, motivation, and much more.
- Lesson on demand - Lesson on Demand is recently a popular way through e-learning on virtual space. There is always a demand for lessons in different forms. Whenever we do need some information on life style, livelihood, essays, dissertations, thesis, we need lessons. There are certain third parties in the market that provide solutions to these issues.
- Virtual University - Today internet has emerged as a big player to provide reliable and easy communication among students and teachers. This further provided space for virtual university environment. Technology-based education, on high-end platform and connectivity has brought a revolution by providing round-the-clock classes, 365 days admission and the student can learn at their pace.
- NPTEL- National Programme for Technology Enabled Learning is a great initiative of Government of India, a joint venture of IIT and IIMs in collaborative efforts of the Ministry of Human Resources Development. One can access the NPTEL through its website i.e. www.nptel.ac.in, <https://www.YouTube.com/user/nptelhrd>.
- NROER- The basic objective of NROER is to provide digital resources to all students and teachers of the country. It is also aimed at providing the participation of the community in development and sharing of digital resources. The major objective was to improve the quality of education, standardization of the education. NROER also helps teachers create and share contextual learning and teaching resources.
- YouTube- It is one of the most popular video sharing websites in the world owned by the Google incorporation. This website is very popular among audiences because of millions of videos covering every aspect be it lifestyle, entertainment, education, knowledge sharing experiences, TV shows, music, movies, etc.

- Spoken Tutorial- It is an initiative of National Mission on Education by Govt. of India through ICT (NMEICT). It is a rather friendly forum for online discussion, registration to the forum is completely free and hardly takes a few minutes to get registered. With the initiative from IIT Mumbai, this program is quite popular in the educational institutions across the country.
- Wiki University- Commonly called Wikiversity, offering more than 20 international languages like French, German, Dutch, Italian, Russian, Portuguese, etc is a knowledge platform in the most popular e-Learning platform. The common Wiki products are Wikipedia, Wiktionary, Wikinews, Wikiquotes, Wikibooks, Wikidata, Wikispecies, Wikisources, Wikivoyages, Mediwiki, Metawiki shows the popularity of this eLearning source.
- TED Talks - is currently quite popular in enhancing knowledge of the E-learning mechanism. Usually, the TED talks are confined to 15-18 minutes only. The energetic and enthusiastic speakers on this talk show speak on a noble idea supported with suitable evidences to draw the attention of academicians and students globally. The topic covers a range of subjects from science to business, technology to global issues. Moreover, these talks are conducted in more than 100 languages.

5.19 CHECK YOUR PROGRESS

Set- 1 Objective type questions-

- a) TEE stands for.....
- b) refers to the process of get knowledge from an electronic application.
- c) The is an interconnected computer networks that uses the (TCP/IP) to link number of computers/devices worldwide.
- d) The is a unified high-speed network backbone for educational institutions in India.
- e)refers to Portable Document Format.
- f) MS Word is a word processor created by
- g) The extension of Microsoft Word file is.....
- h) Kindle, tablet and other smart gadgets are very popular in nowadays for.....

Set- 2 Objective type questions-

- a) Usually in virtual classrooms, the classes are conducted through thevideos or by conducting workshop and modular program through SKYPE, etc.

- b) Virtual Classroom supports instructor and to participate in live context, discussion.
- c)Classroom provides the look and feel of the real class.
- d) Blog opens up a way through which one can be part of a big society, country or world. It can help you to meet new and interesting.....
- e) Virtual university is like a multimedia environment on networks.
- f) Software like Skype which are highly effective on networks which are used for receiving and delivering.....
- g) NPTEL are available on YouTube as well.
- h) National Repository on Open Educational Resources (NROER) is on Open access so that everyone can access the resources.
- i) One can get the free training of popular programming software's like Linux, Scilab, LaTeX, PHP & MySQL, Java, and C/C++ on tutorial.
- j) YouTube the most popular video sharing website in the world which is owned by the incorporation.
- k) TED Talks stands for

Descriptive Type Questions-

- 1) What is Collaborative learning? What is the benefit of students working in class in small groups with shared desktop/laptop computers? Explain.
- 2) What are Massive Open Online Courses (MOOCS)? What is their benefits? Explain some popular MOOCS.
- 3) What is the purpose of the Virtual Labs? What are the different courses where Virtual Labs can be used?
- 4) What are the components of the National Knowledge Network (NKN)? What are its Major benefits? Explain the configuration of National Knowledge Network (NKN)?
- 5) What is the role of E-books in technology-enabled learning? What are their advantages?
- 6) How Online Reading is helpful in technology-enabled learning? How are internet browser like Chrome, Safari, Firefox or Internet Explorer are helpful in online reading?
- 7) What are the important services used for Online Reading? Write the name of commonly used different sites where you can read books online?
- 8) What do you understand by electronic publishing and copyright laws? What is the difference between electronic versions of traditional media and new media?
- 9) What do understand by “Integrated Development of Education and Economic Empowerment for Rural Students”? Explain

- 10) What is Virtual classroom? What is its aim? How it benefits the Technology enabled education?
- 11) What are the applications of technology-enabled education? Explain.
- 12) What are the advantages of a Virtual Classroom? What do you mean by the term “student can learn from anywhere”?
- 13) What are blogs? List and explain briefly some popular blogs in the area of Technology enabled education. What are the advantages of blogs?
- 14) Why is the blog required? What will you get while writing blogs? How will you benefit if you have a digital space in form of blog?
- 15) What do you understand by the term lesson on demand? What are its benefits? What are different companies providing lesson on demands?
- 16) What is a virtual university? What are the advantages of Virtual University? How does it remove geographical barriers?
- 17) What is collaborative learning? How will you provide flexible study environment to the student?
- 18) What do you understand by “learning is no longer location dependent and learners are able to take courses independent of their physical location”? Explain.
- 19) What is National Programme for Technology Enabled Learning? What are the popular courses available in the NPTEL?
- 20) What are the different features of NROER? How does it store all the resources in one place so that there is no need to search for the contents on various websites or pages?
- 21) What are the popular courses and resources available in multiple languages under NROER? Are these resources available in YouTube?

Set- 1 Answers (Objective type question)-

- | | | |
|----------------------------------|--------------------|---------------|
| [a] Technology Enabled Education | [b] E-learning | [c] Internet |
| [d] National knowledge network | [e] PDF | [f] Microsoft |
| [g] .doc or .docx | [h] online reading | |

Set- 2 Answers (Objective type question)-

- | | | | | | |
|--|-------------|-------------|------------|--------------|-----------------|
| [a] NPTEL | [b] learner | [c] Virtual | [d] people | [e] learning | [f] information |
| [g] videos | [h] digital | [i] spoken | [j] Google | | |
| [k] Technology, Entertainment and Design Talks | | | | | |

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UNIT- 6

E-GOVERNANCE

6.1	INTRODUCTION
6.2	OBJECTIVES
6.3	E-GOVERNANCE: AN OVERVIEW
6.4	IMPORTANCE AND BENEFITS OF E-GOVERNANCE
6.5	TYPES OF INTERACTIONS IN E-GOVERNANCE
6.6	E-GOVERNANCE PROJECTS IN INDIA
6.7	CHALLENGES OF E-GOVERNANCE IN INDIA
6.8	POINTS TO REMEMBER
6.9	GLOSSARY
6.10	CHECK YOUR PROGRESS
6.11	BIBLIOGRAPHY/ REFERENCES
6.12	SUGGESTED READINGS

6.1 INTRODUCTION

E-governance because of its scope and aims is highly relevant in today's era. In simple terms, it is the use of information communication technologies (ICTs) to carry out public services, that is to say, the use of the internet to ensure that services are delivered in a much more convenient, customer-oriented, and cost-effective manner. In other words, the e-governance is the application of Information Technology to the processes of government functioning in order to achieve a Simple, Moral, Accountable, Responsive, and Transparent (SMART) Governance.

In the overall perspective, the e-governance is simply the use of ICTs in the operations of government businesses, put in another way, it is the shift from the traditional method of carrying out government activities which is mainly hierarchical, linear, and one-way to the use of internet which enables the public to seek information at their own convenience and not really having to visit the office in person or when government office is open.

The major objectives of e-governance are to improve government processes (e-administration), connect citizens (e-citizens and e-services), and build external interactions (e-society). Despite these objectives, making and implementing decisions, proper leadership, putting in place organizational arrangements, ensuring resources and funding, establishing accountability and measuring success, telecommunications network, internal agency systems, cross-government systems, service delivery network access points, internet access, and skilled staff, better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, and more efficient government management are the factors that must be taken into consideration for the success of e-governance implementation.

6.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Understand the role of e-governance for smart administration.
- Define the importance of e-governance.
- Explore e-governance projects in India.
- Define the types and applications of e-governance.
- Know the challenges of e-governance in India.

6.3 E-GOVERNANCE: AN OVERVIEW

The 'e' in e-Governance stands for 'electronic'. Thus, e-Governance is basically associated with carrying out the functions and achieving the results of governance through the utilization of Information and Communications Technology (ICT). Why countries around the world are increasingly opting for 'e-Governance'? In the last few decades, the expectations of citizens from the government have increased manifold. ICT facilitates efficient storing and retrieval of information, instantaneous transmission of information, processing information & data faster than the earlier manual systems, speeding up governmental processes, taking decisions expeditiously & judiciously, increasing transparency, and enforcing accountability.

The primary purpose of governance is the welfare of citizens. While one aspect of governance relates to safeguarding the legal rights of all citizens, an equally important aspect is concerned with ensuring equitable access to public services and the benefits of economic growth to all. It is expected that e-governance would enable the government to discharge its functions more effectively and can be able to work with more transparency.

In India, during the initial stage of introduction of ICT in governance there was some resistance. There were also serious doubts about whether government employees at all levels

would be able to handle computers. As time passes, all goes beyond and fortunately all these misgivings have proved wrong.

Today, new technology makes the machine-human interface very user-friendly. The Information Technology (IT) and Information Technology Enabled Services (ITES) sectors have created millions of jobs besides improving vastly on the services provided by government undertakings like Banks, Airlines, Railways, etc.

As a country like India, with 1.3 billion population, more than 600,000 villages, growing economy coupled with increasing aspirations of the citizens for a better quality of life – use of Information Technology in improving government processes is not just become vital but essential and without which it would be extremely difficult, if not impossible, to serve its citizens efficiently and transparently and ensure participation of a larger number of people in decision making at all levels of government– Centre, State and local.

The National e-Governance Division (NeGD) is providing strategic direction in terms of framing policies and implementation strategy for the Digital India Programme in different domains of e-Governance. And also provides, proactive support to Central and State Governments for Mission Mode Projects (MMPs) and other e-Governance projects acting as a facilitator and catalyst for the implementation of the Digital India Program by various Ministries and State Governments.

The NeGD also ensures effective citizen engagement and communication with all stakeholders using offline and Social Media channels. The role of NeGD in training and development initiatives, including- development of competency frameworks, training guidelines, case studies, etc. and developing online and web-based training and setting up of Learning Management System, knowledge management and sharing through workshops, development of case studies, sharing best practises, creation of knowledge repositories, etc.

The e-governance is, in essence, the application of Information and Communications Technology to government functioning to create ‘Simple, Moral, Accountable, Responsive, and Transparent (SMART) governance. The e-governance involves the use of ICTs by government agencies for any or all of the following reasons, as-

- Exchange of information with citizens, businesses, or other government departments.
- Speedier and more efficient delivery of public services.
- Improving internal efficiency.
- Reducing costs/increasing revenue.
- Re-structuring of administrative processes and improving the quality of services.

The e-governance aims to make the interaction between government and citizens (G2C), government and business enterprises (G2B), and inter-agency relationships (G2G) more friendly, convenient, transparent, and inexpensive. The goals of e-Governance are-

- Better service delivery to citizens.
- Ushering in transparency and accountability.
- Empowering people through information.
- Improved efficiency within Governments.
- Improve interface with business and industry.

6.4 IMPORTANCE AND BENEFITS OF E-GOVERNANCE

E-governance is about reforms in governance, facilitated by the creative use of Information and Communications Technology (ICT). The importance and benefits of e-governance are not limited in respect to good governance, and citizen empowerment, few of them are as follows-

- E-Governance brings governments closer to the citizens.
- Provide simplicity, efficiency, and accountability in the government- Applications of ICT to governance combined with detailed business process re-engineering would lead to simplification of complicated processes, weeding out of redundant processes, simplification in structures & changes in statutes, and regulations. The end result would be the simplification of the functioning of government, enhanced decision-making abilities, and increased efficiency across government– all contributing to an overall environment of more accountable government machinery. This, in turn, would result in enhanced productivity and efficiency in all sectors of government functioning.
- E-governance empowers people to gather information regarding any department of government and get involved in the process of government decision making.
- E-Governance strengthens democracy by ensuring greater citizen participation at all levels of governance.
- E-Governance leads to automation of services, ensuring that information regarding every work of public welfare is easily available to all citizens.
- E-Governance revolutionizes the way government’s function, ensuring much more transparency in the functioning, thereby eliminating corruption.
- If the information regarding every activity of government is easily available, it would make every government department responsible as they know that every action of theirs is closely monitored.

- Expanded reach of governance- Rapid growth of communications technology and its adoption in governance would help in bringing government machinery to the doorsteps of the citizens. Expansion of telephone network, rapid strides in mobile telephony, the spread of internet, and strengthening of other communications infrastructure would facilitate the delivery of a large number of services provided by the government.
- Proper implementation of e-Governance practices makes it possible for people to get their work done online thereby sparing themselves of unnecessary hassles of travelling to the respective offices.
- Successful implementation of e-Governance practices offers better delivery of services to citizens, improved interactions with businesses, and industries.
- E-governance helps citizen empowerment through access to information, better management, greater convenience, revenue growth, cost reductions, etc.
- Enabling Environment for Promoting Economic development- Technology enables governments to create positive business climates by simplifying relationships with businesses and reducing the administrative steps needed to comply with regulatory obligations. There is a direct impact on the economy, as e-procurement creates wider competition and more participants in the public sector marketplace.

6.5 TYPES OF INTERACTIONS IN E-GOVERNANCE

The e-governance facilitates interaction between different stakeholders in governance using ICT, such types of interactions are grouped into the following, as-

Government to Government Model (G2G)-

The G2G refers to the online communications between government organizations, departments, and agencies based on a super-government database. Moreover, it refers to the relationship between governments. G2G model of e-governance aims to enhance and improve inter-government organizational processes by streamlining cooperation and coordination among various government departments/organizations. The efficiency and efficacy of processes are enhanced by the use of online communication and cooperation which allows for the sharing of databases and resources and the fusion of skills and capabilities.

Government-to-Business (G2B)-

Government to business is another type of e-governance model which enables significant efficiencies to both governments and businesses. G2B includes various services exchanged between government and the business sector services. The business services offered include obtaining current business information, new regulations, downloading application forms, lodging taxes, renewing licenses, registering businesses, obtaining permits, and many more.

Nowadays, the government-to-business (G2B) model has been receiving a significant amount of attention.

Government-to-Citizens (G2C)-

Government-to-Citizens (G2C) model of governance has been designed to facilitate citizen interaction with the government. It allows citizens to access government information and services instantly, conveniently, from everywhere. The government-to-citizen model of governance focuses on customer-centric and integrated electronic services where public services can be provided based on a 'one-stop solution' concept. This implies that every citizen can get single window access to government services. G2C model of governance facilitates several services to the citizens, e.g.,' certifications, paying governmental fees, and applying for benefits schemes of government, etc.

Government-to-Employees (G2E)-

Government is by far the biggest employer and like any organization, it has to interact with its employees on a regular basis. This interaction is a two-way process between the organization and the employee. Use of ICT tools helps in making these interactions fast and efficient on the one hand and increase satisfaction levels of employees on the other so that the G2E model of governance is a valuable model of smart administration.

6.6 E-GOVERNANCE PROJECTS IN INDIA

The Government of India (GoI) established the Department of Electronics in 1970. The subsequent establishment of the National Informatics Centre (NIC) in the year 1977 was the first major step towards e-Governance in India. In the early 1980s, the use of computers was confined to very few organizations. The advent of personal computers brought the storage, retrieval, and processing capacities of computers to Government offices. By the late 1980s gradually, with the introduction of common use software such as word processing and other kinds of software, the computers were put to other uses like managing databases and processing information, etc.

Advances in communications technology further improved the versatility and reach of computers, and many government departments started using ICT for a number of applications like tracking movement of papers and files, monitoring of development programmes, processing of employee's payrolls, generation of reports, etc.

The main thrust for e-governance was provided by the launching of the National Informatics Centre Network (NICNET) in 1987, the national satellite-based computer network. This was followed by the launch of the District Information System of the National Informatics Centre (DISNIC) programme to computerize all district offices in the country for which free hardware and software was offered to the State Governments.

A National Task Force on Information Technology and Software Development was constituted in May 1998, while recognizing Information Technology as a frontier area of knowledge per se, it focused on utilizing it as an enabling tool for assimilating and processing all other spheres of knowledge. It recommended the launching of an 'Operation Knowledge' aimed at universalizing computer literacy and spreading the use of computers and IT in education.

In the year 1999, the Union Ministry of Information Technology was created. By the year 2000, a 12-point minimum agenda for e-Governance was identified by the Government of India for implementation in all the Union Government Ministries/Departments. Some glimpse of the agenda-

- Each Ministry/Department must provide Personal Computers (PCs) with necessary software up to the Section Officer level. Besides, Local Area Network (LAN) must also be set up.
- It should be ensured that all staff with access and need to use computer for their office work are provided with adequate training. To facilitate this, inter alia, Ministries/Departments should set up their own or share other's Learning Centres for decentralized training in computers as per the guidelines issued by the ministry.
- Each Ministry/Department should start using the Office Procedure Automation software developed by NIC to keep a record of receipt of 'dak', issue of letters, as well as the movement of files in the department.
- Payroll accounting and other house-keeping software should be put to use in day-to-day operations.

Emergence of the National e-Governance Plan (NeGP)-

About the future of e-governance, the lighting words by the great visionary Dr. APJ Abdul Kalam, former President of India, in his inaugural address at IIT Delhi (India) during 2003 at International Conference on 'e-governance' can be summarized as- "E-governance has to be citizen-friendly. Delivery of services to citizens is considered a primary function of the government. In a democratic nation of over one billion people like India, e-governance should enable seamless access to information and seamless flow of information across the state and central government in the federal set up. No country has so far implemented an e-governance system for one billion people. It is a big challenge before us."

About National e-Governance Division (NeGD)-

In the year 2009, National e-Governance Division was established by the Ministry of Electronics & Information Technology (MeitY) as an Independent Business Division under the Digital India Corporation. NeGD has played a pivotal role in executing e-governance

Projects and initiatives undertaken by Ministries/ Departments, both at Central and State levels. The roles and responsibilities of NeGD are-

- a) Providing strategic direction in terms of framing policies and implementation strategy for the Digital India Programme in different domains of e-Governance.
- b) Proactive support to Central and State Governments for Mission Mode Projects (MMPs) and other e-governance projects.
- c) Acting as a facilitator and catalyst for the implementation of the Digital India Program by various Ministries and State Governments.
- d) Providing technical assistance to Central Ministries/ State Line Departments in their e-governance projects either directly or in collaboration with professional consultants.
- e) Undertaking technical appraisal of e-governance projects for examining issues like overall technology, architecture, framework standards, security policy, service delivery mechanism, sharing of common infrastructure, etc.
- f) Developing generic / model Expression of Interest (EoI), Request for Proposal (RFP), Standard Contracts, PPP Models, and other related documents for various stages and requirements of projects for the use of States.
- g) Ensuring effective citizen engagement and communication with all stakeholders using offline and Social Media channels
- h) Impact assessment and e-Readiness measurement of e-Governance projects of all States / UTs.
- i) Recruitment, deployment and HR management of specialised resources in the State e-Governance Mission Teams (SeMTs) in all States and UTs
- j) Training and development initiatives, including- (i) Development of competency frameworks, training guidelines, case studies, etc. (ii) Developing Online and Web-based Training and set up Learning Management System (iii) Knowledge management and sharing through workshops, development of case studies, sharing best practises and creation of knowledge repositories, etc

Implementation Strategy for E-governance-

The approach and methodology adopted for NeGP contains the following elements-

- Common Support Infrastructure.
- Governance- Suitable arrangements for monitoring and coordinating the implementation of NeGP under the direction of the competent authorities have been set up.

- Centralized Initiative, Decentralized Implementation.
- Public-Private Partnerships (PPP) model is to be adopted wherever feasible to enlarge the resource pool without compromising on the security aspects.
- Programme Approach at the National and State levels.
- Ownership of Ministries- Under the NeGP, various Mission Mode Projects (MMPs) are owned and spearheaded by the concerned line ministries.

Some Mission Mode Projects implemented by NeGD-

[1] Unified Mobile Application for New-age Governance (UMANG)-

UMANG is envisaged to make e-governance. It provides a single platform for all Indian citizens to access pan India e-Gov services ranging from central to local government bodies and other citizen-centric services. UMANG intends to provide major services offered by central and state government departments, local bodies, and other utility services from private organizations. It provides a unified approach where citizens can install one application to avail multiple government services. UMANG service has been made available on multiple channels like mobile application, web, IVR, and SMS which can be accessed through smartphones, feature phones, tablets, and desktops.

Note- Download UMANG App by giving us missed call on 97183-97183 or Visit-
<https://web.umang.gov.in/web/#/>

[2] DigiLocker-

DigiLocker system is a flagship initiative of the Ministry of Electronics & IT under the Digital India Programme. Targeted at the idea of paperless governance, DigiLocker aims to provide a digital wallet to every citizen of the country so that all lifelong documents/certificates can be electronically held under a single secure digital wallet. DigiLocker is a platform for issuance and verification of documents & certificates digitally, eliminating the use of physical documents. Indian citizens who sign up for a DigiLocker account get a dedicated cloud storage space that is linked to their Aadhaar (UIDAI) number.

Note- To access Digilocker visit at- <https://digilocker.gov.in>

[3] National Centre of Geo-informatics (NCoG)-

NCoG is a single source Geographic Information System (GIS) platform for sharing, collaboration, location-based analytics, and decision support system, catering to central and state ministries/departments/agencies across the country. Under this project, location-based datasets such as data related to central government land banks, mining, forests, industrial parks, water resources, etc. are collated with attribute related data to bring out insights that are useful to support decision making. User departments can now pinpoint their operations,

assets on a map, and plan better. NCoG has provided mobile applications for geo-tagging and creating evidence of completed operations under the Government schemes.

Note- To access NCoG visit at- <https://ncog.gov.in/>

[4]- Rapid Assessment System (RAS)

RAS is online instant feedback for e-services (online as well as offline through counters) delivered by the Government of India and State Governments. The main objective of RAS is to continuously assess the quality of e-Services, through feedback, under each e-governance project and realign processes to achieve targeted benefits. RAS interface prompts the citizens to provide feedback about the quality of service immediately after the citizen avails an e-service of the Government. The analytic features of RAS help integrated departments in system improvement and better delivery of services.

Note- To access RAS visit at- <https://ras.gov.in/>

[5]- Program Management Information System (PMIS)-

PMIS build using Open-source technologies is used to track and monitor project initiation, planning, execution, and management. It can be utilized for Central/State/Integrated MMPs, Departmental and Adhoc projects under the Digital India programme.

Note- To access PMIS visit at- <https://pmis.negd.gov.in/>

[6]- OpenForge platform-

The objective of the OpenForge platform is to promote sharing and reuse of e-governance application source code. In 2015, the Ministry of Electronics & IT, Government of India rolled out the 'Policy on Collaborative Application Development by Opening the Source Code of Government Applications', which provides a framework for archiving government custom-developed source code in repositories and opening these repositories for promoting reuse, sharing and remixing. By opening the source code, the Government wants to encourage collaborative development between Government departments/agencies and private organizations, citizens, and developers to spur the creation of innovative e-governance applications and services.

The scope of the project includes the development of a Collaboration Platform under the 'Source Open Policy'. Further, it includes the creation of a project team, development and maintenance of the platform, on-boarding of departments, promotion of the platform, and community management. The community to be created and managed through the platform will be a key driver in bringing agility and quality to the application development process. It will also lead to further reuse and value addition to the e-governance software landscape.

Note- To access OpenForge visit at- <https://openforge.gov.in/>

[7]- Learning Management System (LMS)-

LMS is a software application that automates the administration, tracking, and reporting of training events. LMS is a pioneer project under e-Kranti (an e-governance plan initiated by the Government of India). It is widely recognised that there is a tremendous need to enhance the skill sets and to develop an adequate number of appropriately trained resources for handling a variety of tasks including those who are expected to design and deliver Government services to the citizens.

Note- To access LMS visit at- <https://lms.gov.in/>

[8]- Miscellaneous e-governance Projects in India-

- Passport Seva Project.
- Immigration, Visa and Foreigners Registration & Tracking (IVFRT).
- Insurance (Department of Banking)
- Income Tax (Ministry of Finance/Central Board of Direct Taxes)
- National Citizen Database/UID (Ministry of Home Affairs/Registrar General of India (RGI)/ Planning Commission, Now NITI Aayog).
- Central Excise (Department of Revenue/Central Board of Excise & Customs)
- Pensions (Department of Pensions & Pensioners Welfare and Department of Expenditure)
- Banking (Department of Banking)
- Land Records (Ministry of Rural Development)
- Road Transport (Ministry of Road Transport & Highways)
- Treasuries (Ministry of Finance)
- E-District (Department of Information Technology)
- Common Services Centres (Department of Information Technology)
- e-Courts (Department of Justice, Ministry of Home Affairs)
- e-Procurement (Ministry of Commerce & Industry/ DGS&D)
- And many more.

6.7 CHALLENGES OF E-GOVERNANCE IN INDIA

- Lack of motivation and awareness towards the role and importance of e-governance.
- Lack of citizen-centric nature of applications and poor cooperation among bureaucrats and people at the local level of governance.
- Lack of trust, poor technical designs which leads to lack of interoperability among distinct e-governance applications, and underutilization of ICT infrastructure resources.

- One of the challenges to attain the ability of high level of data abstraction is to maintain the privacy of data in designing e-governance applications.
- Authentication is very important to know the right user of the services or it may be misused by private competitors. Meanwhile, the digital signature plays a major role in providing authenticity. In fact, it is expensive and causes for frequent maintenance.
- Maintenance should be given due importance because IT ministry has been continuously developing new software to fill the current needs of citizens.
- Digital divide- Even in the era of science and technology, a huge gap exists between users and non-users of e-governance services. In India, majority of the masses, living below poverty line are deprived of government services. This gap needs to be made narrow, and then only the benefits of e-governance would be utilized equally.
- Infrastructure is essentially required for the implementation of e-governance as much as possible in India. Electricity, Internet, and poor adaptability of technology will retard the progress of e-governance. In the context of developing countries, there should be enough basic facilities to give an impetus to e-governance.

6.8 POINTS TO REMEMBER

- E-governance is simply the use of information communication technologies (ICTs) to carry out public services, that is to say, the use of the internet to ensure that services are delivered in a much more convenient, customer-oriented, and cost-effective manner.
- E-governance is the application of Information Technology to the process of government functioning to achieve a Simple, Moral, Accountable, Responsive, and Transparent (SMART) Governance.
- The major objectives of e-governance are to improve government processes (e-administration), connect citizens (e-citizens and e-services), and build external interactions (e-society).
- It is expected that e-governance would enable government to discharge its functions more effectively and can be able to work with more transparency.
- The National e-Governance Division (NeGD) is providing strategic direction in terms of framing policies and implementation strategy for the Digital India Programme in different domains of e-Governance.
- E-governance strengthens the democracy by ensuring greater citizen participation at all levels of governance.
- E-governance revolutionizes the way government's function, ensuring much more transparency in the functioning thereby eliminating corruption.

- The rapid growth of communications technology and its adoption in governance would help in bringing government machinery to the doorsteps of the citizens.
- E-governance helps citizen empowerment through access to information, better management, greater convenience, revenue growth, cost reductions, etc.

6.9 GLOSSARY

- CSC- Common Service Center.
- ERP- Enterprise Resource Planning.
- G2B- Government to Business.
- G2C- Government to Citizen.
- G2E- Government to Employee.
- G2G- Government to Government.
- GPS- Global Positioning System.
- ITeS- Information Technology enabled Services.
- MCA- Ministry of Corporate Affairs.
- NeGD- National e-Governance Division.
- NeGP- National e-Governance Plan.
- NISG- National Institute for Smart Government.
- PPP- Public Private Partnership.
- SMART- Simple, Moral, Accountable, Responsive, Transparent.
- SWAN- State Wide Area Network.

6.10 CHECK YOUR PROGRESS

Descriptive type questions-

- a) What are the benefits of e-governance?
- b) Explain the summarized view of e-governance in India.
- c) List five major challenges of implementing e-governance in India.
- d) Define in short, the various e-governance models.
- e) Define briefly the role and responsibilities of the National e-Governance Division (NeGD).
- f) List the name of ten miscellaneous e-governance projects in India.

Objective type questions-

- a) Infrastructure is essentially required for the implementation of successful e-governance projects. (True/False)
- b) One of the major challenges in implementing successful e-governance projects is a lack of motivation and awareness. (True/False)
- c) The National e-Governance Division (NeGD) is providing strategic direction in terms of framing policies and implementation strategy for the Digital India Programme in different domains of e-Governance. (True/False)
- d) PMIS stands for Prime Minister Information System. (True/False)
- e) DigiLocker aims to provide a digital wallet to every citizen of the country where we can deposit the money. (True/False)
- f) National e-Governance Division was established by the Ministry of
- g) Government-to-Citizens (G2C) model of governance has been designed to facilitate citizen interaction with

Answer (objective type question)-

- [a] True [b] True [c] True [d] False [e] False
 [f] Electronics & Information Technology [g] Government

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UNIT- 7

OPEN EDUCATIONAL RESOURCES (OERs)

7.1	INTRODUCTION
7.2	OBJECTIVES
7.3	HISTORICAL DEVELOPMENT OF OERs
7.4	BENEFITS OF OPEN EDUCATION AND OERs
7.5	CHALLENGES OF USING OERs
7.6	COPYRIGHT AND OPEN LICENSING
7.7	USEFUL OER REPOSITORIES
7.8	POINTS TO REMEMBER
7.9	GLOSSARY
7.10	CHECK YOUR PROGRESS
7.11	BIBLIOGRAPHY/ REFERENCES
7.12	SUGGESTED READINGS

7.1 INTRODUCTION

Open Educational Resources (OERs) are learning materials that can be modified and enhanced because their creators have permitted others to do so. Internet provides vast amounts of OER for use and reuse. Educational institutions usually produce it (sometimes by individuals too) and published online to the general public for their immediate use or repurposing according to the user's needs. Individuals or organizations that create OERs can include materials like presentation slides, podcasts, syllabi, images, lesson plans, lecture videos, maps, worksheets, and even entire textbooks, typically via legal tools like Creative Commons licenses, so others can freely access, reuse, translate, and modify them.

Few perspectives towards OERs-

The William and Flora Hewlett Foundation-

"OER is teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and repurposing by others. Open educational resources include full courses, course materials,

modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge."

OECD (Organisation for Economic Co-operation and Development)-

"Digitised materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research. OER includes learning content, software tools to develop, use, and distribute content and implement resources such as open licenses."

UNESCO (United Nations Educational, Scientific and Cultural Organization)-

"Teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions."

The Cape Town Open Education Declaration-

"Open educational resources should be freely shared through open licenses that facilitate use, revision, translation, improvement, and sharing. Resources should be published in formats that facilitate both use and editing, and that accommodate a diversity of technical platforms. Whenever possible, they should also be available in formats accessible to people with disabilities and people who do not yet have access to the Internet."

Open education is a philosophy about the way people should produce, share, and build on knowledge. Proponents of open education believe everyone in the world should have access to high-quality educational experiences and resources, and they work to eliminate barriers to this goal. Such barriers might include high monetary costs, outdated or obsolete materials, and legal mechanisms that prevent collaboration among scholars and educators. Promoting collaboration is central to open education. As the Open Education Consortium says: "sharing is probably the most basic characteristic of education: education is sharing knowledge, insights, and information with others, upon which new knowledge, skills, ideas, and understanding can be built."

In conclusion, OERs are those teaching and learning materials available either in the public domain or under an open license. "Public domain" in the context of OER means teaching and learning materials for which copyright has expired or for which copyright has been explicitly forfeited by the author while you will learn about open licenses, a free license can allow the adoption/adaptation of work under different circumstances.

7.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Understand OERs and Open Education.
- Define Creative Commons (CC) licenses.
- Define the benefits and challenges of using OERs

- Know the popular OER databases.

7.3 HISTORICAL DEVELOPMENT OF OERs

OER and the open movement have recently evolved, in the year 1999, both the University of Tübingen (Germany) and The Open University (UK) released some educational resources for free. However, the most commonly known OER initiative came from the Massachusetts Institute of Technology (USA) in 2001. By the year 2002, it had released 32 courses with open licenses and set a precedent in terms of university courseware.

In 2002, UNESCO convened the forum on the Impact of Open Courseware for Higher Education in Developing Countries, where OER was coined. Since then, many other education service providers have used open licenses and Internet to share teaching and learning resources.

The Cape Town Open Education Declaration (2008) and the Paris OER Declaration (2012) provided guidelines and encouragement for governments to release educational resources—especially those created using public funding with open licenses. OER's integration into national policy is an ongoing and slow process, but there has been a continuous success.

The Government of India is keen to use technological resources in helping its mission to make higher education accessible to all deserving students. In this regard, it launched its National Mission on Education through Information and Communication Technology (NMEICT) in 2009 to allow all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner, thereby, reducing the digital divide.

Under NMEICT, a proper balance between content generations, research in critical areas relating to the imparting of education and connectivity for integrating our knowledge with the advancements in other countries is to be attempted. This mission seeks to support such initiatives and build upon the synergies between various efforts by adopting a holistic approach. Emphasis on ICT is a crying need as it acts as a multiplier for capacity building efforts of educational institutions without compromising the quality. The mission is also necessary to sustain a high growth rate of our economy through capacity building and knowledge empowerment of the people and promoting new, upcoming multi-disciplinary fields of knowledge.

What are Open Educational Resources (OERs)?

In its simplest form, the concept of Open Educational Resources (OER) describes any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and learners, without an accompanying need to pay royalties or license fees.

The term OER is mostly synonymous as- Open CourseWare (OCW), although the latter may be used to refer to a specific, more structured subset of OER. An Open CourseWare is defined by the OCW Consortium as 'a free and open digital publication of high-quality university-level educational materials. These materials are organized as courses, and often include course planning materials and evaluation tools as well as thematic content'.

OER has emerged as a concept with great potential to support educational transformation, while its educational value lies in the idea of using resources as an integral method of communication of curriculum in educational courses (i.e. resource-based learning), its transformative power lies in the ease with which such resources, when digitized, can be shared via Internet. Importantly, there is only one key differentiator between an OER and any other educational resource- its license.

Thus, an OER is simply an educational resource that incorporates a license that facilitates reuse, and potentially adapts without first requesting permission from the copyright holder.

Is the OER as same as e-learning?

The OER is not synonymous with online learning or e-learning, although many people make the mistake of using the terms interchangeably. Openly licensed content can be produced in any medium: paper-based text, video, audio, or computer-based multimedia. A lot of e-learning courses may harness OER, but this does not mean that OER is necessarily e-learning.

Is the OER the same as open learning/open education?

Although the use of OER can support open learning/open education, OER and open education are not the same. Making 'open education' or 'open learning' a priority has more significant implications than only committing to releasing resources as open or using OER in educational programmes. Open education requires a systematic analysis of assessment and accreditation systems, student support, curriculum frameworks, and mechanisms to recognize prior learning, and so on.

7.4 BENEFITS OF OPEN EDUCATION AND OERs

Benefits of Open Education and OER- The benefits of open education include the following:

- Education open to anyone.
- Affordable, ideally free.
- Students can try the course before signing up.
- Flexible study times not bound by weekly timetables or semester calendars.
- Students work at their own pace.
- Available from anywhere and not restricted by access to school or college.

- Access to a vast amount of study materials.
- Intellectual capital is available for reuse.

Benefits for Instructors-

Cost-saving is a major point in favour of adopting open educational resources, and instructors can utilize OER effectively without replacing paid resources at all. The freedom to adapt OER to instructional needs is often the most attractive aspect of OERs. Since OERs are openly licensed, educators are free to edit, reorder, and remix OER materials. as-

- Use, Improve, and Share- adapt and revise resources that have already been created to fit your course syllabus.
- Create an updated second edition of an existing OER.
- Tailor resources to fit your specific course context (e.g.,', translation, local examples).
- Network and Collaborate with Peers- access educational resources that have been peer-reviewed by experts in your field.
- Create a new open educational resource with a team of your peers.
- Explore user reviews for a more in-depth understanding of the resources available.
- Enable all students to have equal access to your course materials.
- Provide students with the opportunity to explore course content before enrolling.

7.5 CHALLENGES OF USING OERs

Despite, noble intentions behind OER, it turns out that using OER is not always straight forward. Practitioners face various challenges when it comes to harnessing OER as-

- Sourcing appropriate OER- This is an issue because there is no one-stop-shop for OER. They are scattered across the Internet.
- Understanding open licenses- Not everyone is familiar with different open licenses and what they permit.
- Adaptation of OER requires new skills- To adapt and repurpose OER, the practitioner needs more than basic ICT skills and needs practice in revising and remixing resources.
- Traditional mindsets predominate- Many educators feel it is wrong to use other people's work, and thus they protect, rather than sharing their own resources.
- Robust Internet connectivity and good ICT availability are essential to access and adapt OER.
- Schools and universities seldom incentivize lesson creation.

7.6 COPYRIGHT AND OPEN LICENSING

Have you ever written something original of your own? Do you realize that you own the copyright to everything that you write? While many of you studying this course may answer "yes" to both questions, you might have unanswered questions about copyright in writing educational materials.

Knowledge of copyright is essential for everyone who develops learning materials or is in the writing profession, particularly to avoid committing copyright infringement. With the emergence of OER, understanding copyright has become especially important, as you can use learning materials produced by others if they are made available under an open license.


Copyright is an exclusive, transferable right given by law to a creator/author for a fixed number of years to copy, print, publish, perform, film, record, or otherwise control the use of literary, musical, dramatic or artistic works. Copyright is a legal protection given to the original creator of a work, which may be in any form.



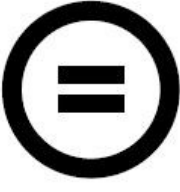
Over the last two decades, open-content licensing systems have been evolving and developing. Some were initially established to support the release of open software and expanded to support the licensing of open content others focus exclusively on either software or content. The following are some of the open licensing systems that you might encounter in your Internet searches, as- GNU General Public Licence (for software), GNU Free Documentation Licence (for manuals, texts), Open Publication Licence (content), Open Game Licence (computer games), Free Art Licence (art, images, graphics), Creative Commons (Content), etc.

In the area of OER, which focuses specifically on educational content, the Creative Commons licenses are the ones most extensively used. However, open education purists are quick to point out that not all Creative Commons licenses can be considered completely "open." We will discuss the Creative Commons license options and their degrees of openness.

The Creative Commons (CC) Licensing System-

In recent years, Creative Commons License (CC) has in education, become the most popular licensing system. Creative Commons has designed a collection of licenses to ensure a suitable license for sharing content under various conditions as-

Condition	Symbol	Explanation
Attribution		All CC licenses require that others who use your work in any way must attribute it– i.e., must reference the work, giving you credit for it– the way you request, but not in a way that suggests you endorse them or their use of the work. If they want to use your work without giving you credit or for endorsement

		purposes, they must first get your permission.
ShareAlike		You let others copy, distribute, display, perform, and modify your work, as long as they distribute any modified work on the same terms. If they want to distribute modified works under other terms, they must get your permission first.
NonCommercial		You let others copy, distribute, display, perform, modify (unless you have chosen NoDerivatives) and use your work for any purpose other than commercially. If they want to use your work commercially, they must get your permission first.
NoDerivatives		You let others copy, distribute, display, and perform only original copies of your work. If they want to modify your work, they must get your permission first.

The most popular combinations of Creative Commons (CC) rights or conditions make are-



[1] Attribution (CC BY)

This license lets others distribute, remix, tweak and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered recommended for maximum dissemination and use of licensed materials.



[2] Attribution-ShareAlike (CC BY-SA)

This license lets others remix, tweak and build upon your work, even for commercial purposes, as long as they credit you and license their new creations under the identical terms. This license is often compared to "copyleft" free and open-source software licenses. All new works based on yours will carry the same license, so any derivatives will also allow commercial use. This is the license used by Wikipedia, and it is recommended for materials that would benefit from incorporating content from Wikipedia and similarly licensed projects.

[3] Attribution- NoDerivatives (CC BY-ND)



This license allows for redistribution commercial and non-commercial as long as the work is passed along unchanged, in whole, and with credit to you.



[4] Attribution-NonCommercial (CC BY-NC)

This license lets others remix, tweak and build upon your work noncommercially, and although their new works must also acknowledge you and be non-commercial, they don't have to license their derivative works on the same terms.



[5] Attribution- NonCommercial- ShareAlike (CC BY-NC-SA)

This license lets others remix, tweak, and build upon your work noncommercially, as long as they credit you and license their new creations under the identical terms.



[6] Attribution- NonCommercial- NoDerivatives (CC BY-NC-ND)

This license is the most restrictive of the six main licenses, only allowing others to download your works and share them with others as long as they credit you, but they can't change them in any way or use them commercially.

7.7 *USEFUL OER REPOSITORIES*

[1] OER Commons & Open Education (www.oercommons.org)-

The worldwide OER movement is rooted in the human right to access high-quality education. This shift in educational practice is not just about cost savings and easy access to openly licensed content, it's about participation and co-creation. Open Educational Resources (OER) offer opportunities for systemic change in teaching and learning content through engaging educators in new participatory processes and effective technologies for engaging with learning. The move to open education practice (OEP) is more than a shift in content. It is an immersive experience in collaborative teaching and learning. OEP leverages open education resources (OER) to expand the role of educators, allowing teachers to become curators, curriculum designers, and content creators.

[2] Community College Consortium for OER (CCCOER, www.cccoer.org)-

CCCOER is a growing consortium of community and technical colleges committed to expanding access to education and increasing student success by adopting open educational policy, practices, and resources. We provide community and resources to learn about the evolving practice of open education.

[3] OER Metafinder (<https://oer.deepwebaccess.com/oer/desktop/en/search.html>)-

A single search engine of dozens of open access and open educational databases all in one. A Google for OER.

[4] MERLOT (<https://www.merlot.org/merlot/index.htm>)-

The MERLOT system provides access to curated online learning and support materials and content creation tools, led by an international community of educators, learners, and researchers.

[5] Open Course Library (<http://opencourselibrary.org>)-

Open Course Library is a collection of high quality, free-to-use courses that you can download and use for teaching. All content is stored in Google docs, making it easy to access, browse, and download.

[6] Open Research Library (<https://openresearchlibrary.org/home>)-

The Open Research Library includes all Open Access scholarly book content worldwide on one platform for user-friendly discovery, offering a seamless experience navigating more than 20,000 Open Access books.

[7] Open Knowledge Repository (<https://openknowledge.worldbank.org>)-

The World Bank is the largest single source of development knowledge. World Bank Open Knowledge Repository (OKR) is the World Bank's official open-access repository for its research outputs and knowledge products.

[8] National Science Digital Library (<https://nsdl.oercommons.org>)-

National Science Digital Library provides high quality online educational resources for teaching and learning, with current emphasis on the sciences, technology, engineering, and mathematics (STEM) disciplines. NSDL collection links to web-based educational resources held on other sites by their providers.

[9] Openly Available Sources Integrated Search (OASIS, <https://oasis.geneseo.edu/index.php>)-

The OASIS is a search tool developed by SUNY Geneseo, in consultation with Alexis Clifton, SUNY OER Services Executive Director, that aims to make the discovery of open

content easier. OASIS currently searches open content from 73 different sources and contains 171,998 records.

[10] Live Lingua (www.livelingua.com)-

A collection of U.S. Government created public domain language eBooks and a/v resources for almost every language.

[11] Skills Commons (<https://www.skillscommons.org>)-

A repository of OER supported by the U.S. Department of Labor's Trade Adjustment Assistance Community College and Career Training (TAACCCT) program that lets you browse by material type, discipline, credential type, and more.

[12] Teaching Commons (<https://teachingcommons.us>)-

A showcase of high-quality open educational resources from leading universities. Curated by librarians and their institutions and hosted by bepress, the Teaching Commons includes open-access textbooks, course materials, lesson plans, multimedia, lectures, k-12 materials, and more.

[13] WikiEducator (https://wikieducator.org/Main_Page)-

An evolving online community intended for the planning of education projects linked with the development of free content and the development of free content on WikiEducator for free learning.

7.8 POINTS TO REMEMBER

- OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others.
- Open educational resources (OERs) are learning materials that can be modified and enhanced because their creators have permitted others to do so. Internet provides vast amounts of OER for use and reuse.
- Open education is a philosophy about the way people should produce, share, and build on knowledge.
- Government of India is keen to use the technological resources in helping its mission to make higher education accessible to all deserving students.
- Government of India launched its National Mission on Education through Information and Communication Technology (NMEICT) in 2009 to provide opportunity for all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner.

- OER is not synonymous with online learning or e-learning, although many people make mistake of using the terms interchangeably.
- Although, the use of OER can support open learning/open education, OER and open education are not the same. Making 'open education' or 'open learning' a priority has significantly bigger implications than only committing to releasing resources as open or using OER in educational programmes.
- Knowledge of copyright is essential for everyone who develops learning materials or is in the writing profession, particularly to avoid committing copyright infringement. With the emergence of OER, understanding copyright has become especially important, as you can use learning materials produced by others if they are made available under an open license.
- Creative Commons License (CC) has, in education, become the most popular licensing system. Creative Commons has designed a collection of licenses to ensure that there is a suitable license for sharing content under most popular six conditions, e.g.,', CC BY, CC BY-SA, CC BY-ND, CC BY-NC, CC BY-NC-SA, and CC BY-NC-ND

7.9 GLOSSARY

- OER- Open educational resources.
- OECD- Organisation for Economic Co-operation and Development.
- UNESCO- United Nations Educational, Scientific, and Cultural Organization.
- NMEICT- National Mission on Education through Information and Communication Technology.
- OCW- Open CourseWare.
- CC- Creative Commons.

7.10 CHECK YOUR PROGRESS

Objective type questions-

- a) The abbreviation OER stands for.
- [A] open education resources. [B] open educational resources.
- [C] open education roundtable. [D] open educational restrictions.
- b) OER is a subset of the term
- [A] open education. [B] open courseware.
- [C] open access. [D] open software.
- c) Two OER declarations, one in Cape Town the other in Paris, encouraged national governments to

- [A] pass laws that made all educational content open.
- [B] release publicly funded educational content as open.
- [C] create a generic set of texts that all countries could share.
- [D] ban publishing for profit.
- d) The educational institution that has been releasing nearly all its teaching and learning content since 2002 is
- [A] Oxford University. [B] The Sorbonne.
- [C] Massachusetts Institute of Technology. [D] Tübingen University.
- e) One of the benefits of OER that particularly appeals to education managers is
- [A] tracking to see what students are doing online.
- [B] automated systems that ease administration.
- [C] using online communication channels to share data.
- [D] cost savings in providing educational content.
- f) One of the main challenges in encouraging educators to adopt OER is
- [A] suspicion of other people's resources.
- [B] concern over losing control of materials that have income-earning potential.
- [C] lack of digital skills to exploit OER.
- [D] all of the above.
- g) One of the benefits to an institution that releases teaching materials as OER is
- [A] safeguarding their materials from being copied.
- [B] enabling prospective students to ascertain whether the university is right for them.
- [C] cornering the market for a particular subject; everyone else appears to be copying.
- [D] increasing enrolments.
- h) Some OER encourage "repurposing," which means
- [A] you can adapt the resource for new contexts.
- [B] you must preserve the resource "as is."
- [C] you must preserve the "purpose" of the resources.
- [D] you must stipulate to the authors what you intend to do with the resource.
- i) The term "free" means the same as "open." (True/false)
- j) The Internet was one of the factors that made OER possible. (True/false)

Descriptive type questions-

- a) What do you understand by open educational resources?
- b) What do you understand by Copyright and Open Licensing?
- c) What are the challenges of using OERs?
- d) Define the most popular conditions of Creative Commons License types in brief.
- e) Write down five benefits of using OERs.
- f) List some useful OER repositories.

Answers (Objective type questions)-

[a] open educational resources [b] open education [c] release publicly funded educational content as open [d] Massachusetts Institute of Technology [e] cost savings in providing education content [f] all of the above [g] enabling prospective students to ascertain whether the university is right for them [h] you can adapt the resource for new contexts [i] False [j] True

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- A Basic Guide to Open Educational Resources (OER), Prepared by Neil Butcher for the Commonwealth of Learning & UNESCO, edited by Asha Kanwar (COL) and Stamenka Uvalic Trumbic (UNESCO), Published in 2011, 2015 by the United Nations Educational, Scientific and Cultural Organization and Commonwealth of Learning, ISBN 978-1-894975-41-4.

7.12 SUGGESTED READINGS

- Understanding Open Educational Resources, Commonwealth of Learning, 2015, ISBN 978-1-894975-72-8.
- A Basic Guide to Open Educational Resources (OER), Prepared by Neil Butcher for the Commonwealth of Learning & UNESCO, edited by Asha Kanwar (COL) and Stamenka Uvalic Trumbic (UNESCO), Published in 2011, 2015 by the United Nations Educational, Scientific and Cultural Organization and Commonwealth of Learning, ISBN 978-1-894975-41-4.

UNIT- 8

MASSIVE OPEN ONLINE COURSES (MOOCs) & E-REPOSITORIES

8.1	INTRODUCTION
8.2	OBJECTIVES
8.3	MASSIVE OPEN ONLINE COURSE
8.4	TYPES OF MOOCs
8.5	ROLE OF MOOCs IN TODAY'S PERSPECTIVE
8.6	BENEFITS OF MOOCs
8.7	MOOCs AND OPEN AND DISTANCE LEARNING
8.8	MOOC PLATFORMS IN INDIA
8.9	BENEFITS OF E-REPOSITORIES
8.10	NATIONAL DIGITAL LIBRARY OF INDIA (NDLI)
8.11	NATIONAL ACADEMIC DEPOSITORY (NAD)
8.12	OPEN GOVERNMENT DATA (OGD) PLATFORM, INDIA
8.13	POINTS TO REMEMBER
8.14	GLOSSARY
8.15	CHECK YOUR PROGRESS
8.16	BIBLIOGRAPHY/ REFERENCES
8.17	SUGGESTED READINGS

8.1 INTRODUCTION

In this competitive era, learners and teachers want to learn more and more beyond his or her courses through technology-enabled learning. It should be beneficial for Massive Open Online Course (MOOC).

Using these techniques, learners can get using up-to-date information with simple, accessible technology. Concerned course runs on an easily-to-use learning platform available via

Internet. Technology-Enabled Learning like MOOCs offers flexibility with options for learning the content. You can learn from readings, videos, discussions with other participants and instructors, meaningful exercises, quizzes, and short assignments. Many courses of MOOCs also provide a certificate for those who wish to complete all required exercises and quizzes.

E-repository is a mechanism for managing and storing digital content. E-repositories or digital repositories may include a wide range of content for a variety of purposes and users. A repository can support research, learning, and administrative processes. Typically, content can include research outputs such as journal articles or research data, e-theses, e-learning objects and teaching materials, and administrative data. Repositories use open standards to ensure that the content is accessible and can be searched and retrieved for later use. The use of these agreed international standards allows mechanisms to be set up, importing, exporting, identifying, storing, and retrieving the digital content within the repository.

8.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Get familiar about the Massive Open Online Course (MOOCs).
- Origin and History of MOOCs
- Role of MOOCs in today's perceptive
- MOOCs and Open and Distance Learning.
- Development process of MOOC programmes.
- Know about the National Digital Library and resources available.
- Understand the benefits of e-repositories.
- Explore National Academic Depository.
- Explore the Open Government Data Platform.

8.3 MASSIVE OPEN ONLINE COURSE

Massive open online courses (MOOCs) are one of the most popular trends in education in recent years. It represents open access, global, free, video-based instructional content, problem sets, and forums released through an online platform to a high volume of participants aiming to take a course or to be educated.

So, MOOCs are free, large-scale online courses offered and taught by accredited institutions of higher education and school in which anyone can enroll, regardless of age, location, or previous education.

History of MOOC-

The history of MOOCs is not too old. The term first appeared in 2008, by Stephen Downes and George Siemens based on the 'connectivist' distributed peer learning model. Later, in

2011, a few more educational videos were developed by professors from Stanford University and released through open online platforms supported with free web resources. It was not until 2011, that MOOCs would make a name for themselves in the media. Sebastien Thrun and Peter Norvig, professor at Stanford University and Research Director at Google respectively, announced that one of their courses would be given for free on the internet. Over 160,000 enrollees were ready to follow their first lesson in, "Introduction to Artificial Intelligence" within a few weeks.

Later, they established Coursera as an independent for-profit technology in early 2012. In the same year, other independent non-profit initiatives such as Udacity (set up Sebastian Thrun) and Udemy were established. Following it, MIT and Harvard incorporated their MITx platform into EdX. MIT developed the MITx platform for offering MOOCs, which was renamed edX.

Definition

MOOCs though defined by various authors can be classified into the following types.

International Context-

Selwyn, Bulfin, & Pangrazio (2015) state that "MOOCs are courses available to masses of online learners for little or no cost."

The Commonwealth of Learning (2015) proposes a definition that already includes some specification "A MOOC is an online course that requires no prior qualifications for entry, can be accessed by anyone who has an internet connection and includes large or very large numbers of learners."

European Context-

In the framework of the pedagogical research developed as a collaboration with different EU-funded MOOC projects, a more comprehensive definition was adopted "an online course designed for a large number of participants that can be accessed by anyone anywhere, as long as they have an internet connection, is open to everyone without entry qualifications and offers a full/complete course experience online for free" (Brouns et al., 2014).

Overall characteristics of MOOC definitions

Bates (2015) specifies the essential elements behind each acronym of MOOC. Common in these definitions are the following aspects to give meaning to the elements of a MOOC:

Massive: Designed for in theory, an unlimited number of participants. This means that the course is designed such that the effort of all services does not increase significantly as the number of participants increases.

- Open: access to the course is free without entry qualifications.

- Online: the full course is available through internet.
- Course: offers a complete learning experience, i.e., structured around a set of learning goals in a defined area of study and includes the course materials, quizzes, feedback, examination, and certificate of completion.

MOOCs can be seen as the latest sophisticated development in educational technology using electronic media and ICT (information and communications technology) to create VLEs (virtual learning environments).

"The central and dominant aim of education by ICT and MOOCs is to bring the world to the classroom, to make universally available the finest teacher's services."

According to the Cambridge dictionary, "MOOC is a course of study that is made available over the internet and that can be followed by a large number of people."

8.4 TYPES OF MOOCs

The terms "cMOOC" and "xMOOC" were coined by Stephen Downes, co-creator of the first MOOC, to hit the web. Launched in 2008, the course was called "Connectivism and Connective Knowledge."

cMOOCs are based on the learning theory of Connectivism, which emphasizes the power of networking with other individuals, gleaning from diverse opinions, and focusing on end-goals as the foundation of learning.

According to George Siemens, co-creator of that first MOOC, cMOOCs are "based on the idea that learning happens within a network, where learners use digital platforms such as blogs, wikis, social media platforms to make connections with content, learning communities and other learners to create and construct knowledge."

xMOOC stands for eXtended Massive Open Online Course. Instead of being structured as an open online community of learners, xMOOCs are based on a more traditional classroom structure. They are a combination of a pre-recorded video lecture with quizzes, tests, or other assessments. xMOOCs are centered around a professor rather than around a community of students.

Difference Between xMOOC and cMOOC	
XMOOC	cMOOC
xMOOC stands for eXtended Massive Open Online Course	The 'c' in cMOOC stands for connectivist
These MOOCs are based on traditional university courses.	cMOOCs are "based on the idea that learning happens within a network
Participant builds the objective of cMOOC	Teacher builds the objective of xMOOC

xMOOC examples on platforms like edX, Coursera, and Udacity	cMOOCs often contain content and promote interaction through Blogs, Learning communities, Social media platforms.
Lecture is delivered by an instructor to the student.	In this environment, participants are all considered teachers AND learners.

8.5 ROLE OF MOOCs IN TODAY'S PERSPECTIVE

MOOC stands for “massive open online course.” The term was coined by a group of Canadian academics in 2008 to represent an online class. But now day Massively Open Online Courses (MOOCs) are a hugely popular phenomenon in the online learning world. They are hailed by many as a solution for the developing world's lack of access to education because MOOCs can provide learning opportunities to a massive number of learners from anywhere in the world as long as they can access the course through the Internet. However, a close consideration of the ability of learners from most developing countries to make use of MOOCs seems to contradict this rhetoric.

Coursera, EdX, and Futurelearn have come up as the prominent platforms in exploring the possibilities and promotion of MOOCs programs. In 2018, for the first time, more than 100 million people learned with MOOCs (Class Central, 2018b) – and more than 50% used MOOCs to upgrade their labour-market relevant skills (Shah, 2018). The potential of MOOCs to deliver education around the globe has created great interest not only in academic circles but also in the news, making MOOCs a contemporary buzzword. The growing global demand for higher education places, especially in India, where 40 million additional university places are estimated to be required by 2025 (Everitt,2013), provides a strong case for MOOCs as an alternative to in-person university education.

Reasons for the growing popularity of MOOCs-

Why do colleges and universities want to get involved in MOOCs? What's more exciting than teaching tens of thousands of students all around the world? One common reason for doing a MOOC is that it can be taken by anyone, anywhere in the world. One can gain access to the course material and the professional direction from some of the best universities and professors in the world. The best part is that most of these courses are at no cost and you can take them at your own convenience and pace. You could take a class on a subject that is not available in your college, or you could just simply take a course to increase your knowledge base and check out another professor's view on a topic of your subject specializations. Let's have a look at some of these reasons in detail.

8.6 BENEFITS OF MOOCs

MOOCs have unique characteristics that distinguish them from traditional online courses. The following are the key features that act as characteristics differentiating learning in MOOCs

- **Massiveness:** platforms are scalable, where the courses can support massive numbers of learners.
- **Openness:** courses are open to anyone to participate at anytime and anywhere for free without commitment or prior requirements.
- **Diversity (heterogeneity):** participants are from various cultures, backgrounds, and have various motivations.

As with any learning strategy, MOOCs have advantages and disadvantages. The benefits of MOOCs include the following-

- Encourage lifelong learning and improve knowledge and skills.
- Provide a chance to exchange ideas, views, and knowledge with other participants who share the same interest.
- Offer the opportunity to join high-quality courses delivered by renowned professors in prestigious universities across the globe.
- Remove time and place constraints.
- Learners benefit from self-paced learning in MOOCs without the pressure of passing the course or obtaining good grades.

8.7 MOOCs AND OPEN AND DISTANCE LEARNING

The buzz word common in MOOCs and Open and Distance Learning (ODL) is open. The concept of open has birth to several strong movements in the world especially Open-source movement in computer software. Before going to know about the relation between ODL and MOOC, we must be known about ODL.

ODL is a general term for the use of telecommunication to provide or enhance learning. Around the world, the academic community is discovering and exploring the Internet, teleconferencing, and related means to achieve an extended classroom or learning experience.

'Distance Learning' term was first used in the 1970s and became more popular in 1982 after the International Council for Correspondence Education changed its name to the International Council for Distance Education (Holmberg, 2005). The organization is currently known as the International Council for Open Distance Education (ICDE) and promotes open, flexible, distance, and online education.

Michael Moore (1973) defined distance education as "The family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, includes those that in contiguous situations would be performed in the learner's presence so that communication between teacher and the learner must be facilitated by print, electronic, mechanical or other devices."

When Open University in the United Kingdom was established, its first Vice-Chancellor Lord Crowther said, the University will be open to people, place methods and ideas. This was a landmark in the history of openness in education. Thus, openness received new meaning beyond access as:

- No qualification requirement for entry.
- No physical boundary of the institution.
- Use of broadcasting and available technology to teach.
- Innovation with a focus to improve learning.

MOOCs, OERs, and ODL-

As sharing of information on the web became easy, more universities and institutions started depending on what is available on the web. This led to the emergence of open content in 1998, and MIT open courseware was announced in 2001. The MIT OpenCourseWare released its first set of 50 courses in 2002. During the same year, UNESCO organized a forum on the impact of the open courseware for Higher Education in Developing Countries that created the term Open Education Resources (OER).

The Forum defined OER as "the provision of educational resources enables by information, use, and adaption by a community of users for non-commercial purposes. There are several OER initiatives that deserve mention apart from the widely known MIT OpenCourseWare. Some of these are Connexion, OpenLearn, Japan Open Courseware, Consortium the China Open Resources for Education, NPTEL, the Indian Governments OER project through IITs, and the Vietnam Foundation.

The emergence of Massive Open Online Courses (MOOCs) in 2008, followed by several for-profits and not-for-profit initiatives in the recent past, has supported a scenario, where teaching and learning can be served by anyone and any organization not necessarily by university alone.

MOOCs truly take advantage of the digital world and Internet to deliver teaching and learning to a large number of students, and are based on the principles of economies of scale of ODL. In addition, these are courses open to anyone with access to internet and interest to study a course or subject.

8.8 MOOC PLATFORMS IN INDIA

In recent years, the enrolment in Massive Open Online Course (MOOC) has increased tremendously. India, after the US, is dominating the global growth in enrolments. Seeing the growth of enrolment from the country and to satisfying the need for education India has started various projects to offer MOOC courses. Currently, NPTEL, mooKIT, IITBX, and SWAYAM are the platforms used in India for offering courses.

Many initiatives have been taken by the Indian government to provide and support the concept of open education. Initially, the objective was to provide open resources in terms of repositories, libraries, educational media files, e-books, etc. These were made accessible to everybody. Some of the efforts in this direction started as National Digital Repository of IGNOU, Sakshat providing e-content, Shishya for XI-XII Standards by CBSE Board, and Vidya Vahini integrating IT into the curriculum of rural schools by providing interactive training and developmental communication. Most of these initiatives started with establishing a dedicated department to make education reachable to many learners as much as possible.

NPTEL

NPTEL stands for National Programme on Technology Enhanced Learning. It is a project funded by MHRD, initiated in 2003. It is a joint initiative of seven Indian Institute of Technology (IITs) and Indian Institute of Science (IISc) for offering courses on engineering and science, initially. NPTEL has started online courses on computer science- electrical, mechanical, and ocean engineering; management, humanities, music, etc. It offers a free course with nominal fees for certification. Anybody from anywhere can join their course.

MooKIT

MooKIT is a lightweight MOOC management system built entirely using open-source technologies by Indian Institute of Kanpur (IITK), in 2014. It is so designed that if the current bandwidth is low, it can easily run. These features help learners from rural areas not having smartphones, laptops, internet connectivity, and high bandwidth. It just needs a dumb or basic phone. One more special feature of MooKIT is support of a very powerful analytics interface.

IITBombayX

IITBombayX is a non-profit MOOC platform developed by IIT Bombay using the open-source platform Open edX, in 2014.

SWAYAM

SWAYAM stands for "Study Webs of Active Learning for Young Aspiring Minds." It is a MOOC platform MOOC launched by the Ministry of Human Resource Development (MHRD), the government of India, to bind online and offline education together. It is started

with an expectation of launching 2,000 courses, to make its largest course catalogue, among all provided so far. For SWAYAM, an independent platform is developed.

Currently, SWAYAM offers courses for school, certificate, diploma, undergraduate, and postgraduate.

8.9 BENEFITS OF E-REPOSITORIES

- Opening up outputs of the institution to a worldwide audience.
- Maximizing the visibility and impact of the content stored in repositories.
- Showcasing the institution to interested constituencies – prospective staff, prospective students and other stakeholders;
- Collecting and curating digital output.
- Managing and measuring research and teaching activities.
- Providing a workspace for work-in-progress and for collaborative or large-scale projects;
- Enabling and encouraging interdisciplinary approaches to research.
- Facilitating the development and sharing of digital teaching-learning materials and aids.
- It supports student endeavors, provides access to theses and dissertations, and a location for the development of e-portfolios.

Role of e-repositories in e-learning

There are tremendous benefits of e-repositories in managing and sharing of e-learning resources. E-repository can be highly effective from an institution's viewpoint and management strategy. However, we should try to accommodate institutional repositories for achieving the e-learning goals. We should use repository software designed for academic



Figure 1 National Digital Library of India (<http://ndl.iitkgp.ac.in>)

publications, which makes it available for learning resources.

8.10 NATIONAL DIGITAL LIBRARY OF INDIA (NDLI)

Ministry of Human Resource Development (MHRD), under its National Mission on Education through Information and Communication Technology (NMEICT), has initiated the National Digital Library of India (NDLI) project to develop a framework of virtual repository of learning resources with a single-window search facility. Filtered and federated searching is employed to facilitate focused searching so that learners can find out the right resource with least effort and in minimum time. NDLI is designed to hold content of any language and provides interface support for leading vernacular languages, (currently Hindi, Bengali and several other languages are available). It is designed to provide support for all academic levels including researchers and life-long learners, all disciplines, all popular forms of access devices and differently-abled learners. It is being developed to help students to prepare for entrance and competitive examinations, to enable people to learn and prepare from best practices from all over the world and to facilitate researchers to perform inter-linked exploration from multiple sources. It is being developed at the Indian Institute of Technology Kharagpur.

Why should I recommend NDLI?

NDLI will provide a single window search facility to act as a one-stop shop for all digital educational resources. Information can be personalized based on the education level, choice of language, difficulty level, media of content and such other factors while other Digital libraries may not include all these choices. NDLI provides interface support for the leading

The screenshot shows a 'Member Log-In' window. It features a title bar with a close button. The main area contains two input fields: 'E-mail address' and 'Password'. Below the password field is a CAPTCHA image showing the number '708664' and a refresh button. To the right of the CAPTCHA is a label 'Enter the displayed te'. Below the CAPTCHA is a 'Remember me' checkbox. At the bottom right is a green 'Log-In' button. At the bottom left is an orange 'Account recovery' button, and at the bottom right is a teal 'Register' button.

Figure 2 Member login window

vernacular languages and thus one can select the language of his/her choice to search or browse through NDLI. In other words, it is like a 'customised service' provided in a 24x7 integrated environment to suit a user's requirement and will be like a single 'go-to' shop for any requirement.

How can I register on NDLI?

An individual or institute can simply type in the URL (<https://ndl.iitkgp.ac.in> or <https://www.ndl.gov.in>) into a common web browser's address bar to access the NDLI website. However, for better user experience on mobile devices, it is highly recommended to use the NDLI mobile application, available for the respective mobile platform (Google play store or Apple store).

The NDLI system is accessible to all users for general browsing and viewing full text contents. However, one needs to register with a user id and password and login using those credentials for accessing the full text contents of any item under National Licensing (contents with the sign NDLI as in South Asia Archive, World eBook Library etc.)

If you are a new user than click on the Homepage and you will find a Log-In tab (see figure 7.2) on the top right-hand corner. Click on the tab whereby a window will open with options for Member log-in, Register or Account recovery. Click on the 'Register' button whereby a registration form will open. Fill up all the details on the form, tick the box on 'I have read, understood and agree to the Terms and Conditions of using NDLI' and submit. You will soon get a validation link in your mailbox. Click the link and validate and then you can start using NDLI. From next time onwards, you can simply use the Log-In option on the Home page for accessing NDLI.

Resources type availability by-

[1] School-

This collection is for school students. Text books of NCERT and 20 other school boards, question papers, video lectures, materials for exam preparation, solutions to questions of JEE Main and JEE Advanced and several other study materials are available.

[2] CBSE Examination Preparation Contents-

This specially curated collection is for the students appearing for Class-X and Class-XII examination. It contains books, notes, questions, solutions, video lectures, etc.

[3] Engineering-

This collection contains lecture videos and notes of NPTEL/SWAYAM courses, presentations used by faculties in classes, online class lectures, questions/solutions of common subjects for students of all engineering discipline.

[4] Science

This contains lecture videos and notes of NPTEL/SWAYAM courses, online class lectures, some books and questions/solutions for undergraduate students across all science discipline.

[5] Humanities

This collection contains books, questions/solutions, video lectures, articles, and notes for undergraduate students of humanities and social science.

[6] Literature

This collection is for undergraduate and postgraduate students of language and literature and also for general readers. This collection contains literary works as well as study materials on English, Hindi, Sanskrit, Urdu, and Bengali languages.

[7] Law & Management

"Law" section is for law students and practitioners. It contains lecture videos, acts, judgments, articles and notices. The "Management" section contains management and accounting questions and solutions, video lectures and some books, notes, articles and thesis relevant for accounting, commerce and management students.

Resources searched by-**[1] Content type-**

The following types of contents available to search e.g.,' Text, Video, Image, Audio, Presentation, Simulation, Application, Animation

[2] Subject type-

Click on First level subject and select one from the list. To refine your search, click on the Second level subject (if available) and select one from the list; And to refine more your search click on Third level subject (if available) and select one from the list.

[3] Source type-

Joint Admission Board of IITs, Graduate Aptitude Test in Engineering, Spoken Tutorial, NPTEL, NCERT and other source organizations.

[4] learning Resources type-

Articles, Audio Lectures, Book, Question Paper, Thesis, Video Lecture and other types.

8.11 NATIONAL ACADEMIC DEPOSITORY (NAD)

Indian Higher Education system is a large and growing system with approximately 55 school boards, 359 state universities, 123 deemed universities, 47 central universities and 260 private universities. Apart from these, there are 107 other institutions such as

IISc/IITs/IIMs/NITs/IISERs/IIITs/NITIE and 12 other centrally funded institutions. These institutions issue academic awards to students including degrees, diplomas, and certificates

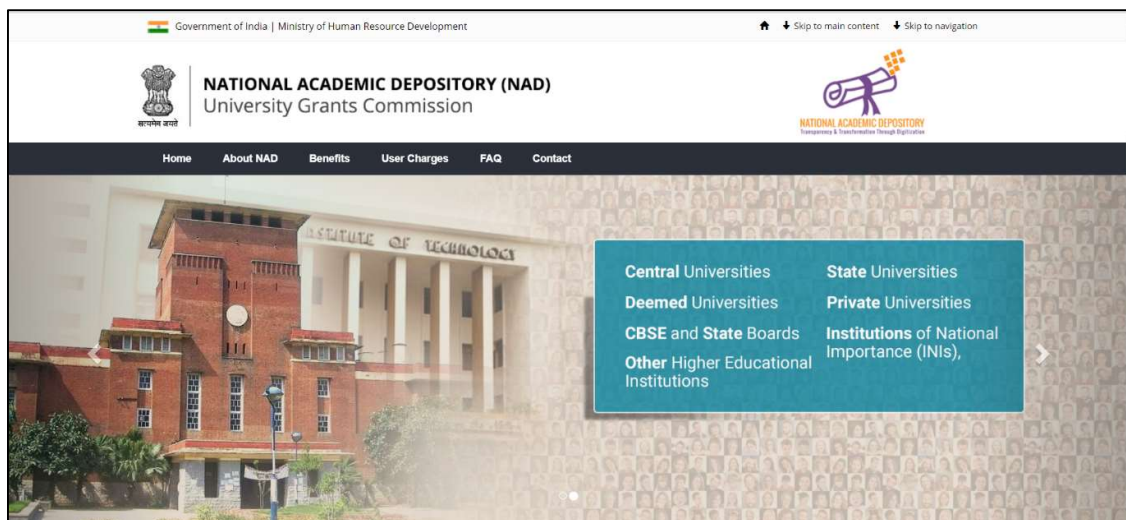


Figure 3 The national Academic Depository ((www.nad.gov.in))

along with mark sheets and evaluation reports.

Maintaining academic awards in an electronic depository would provide benefits to educational institutions, students, and employers by enabling online access of academic awards, which will eliminate the need for persons to approach educational institutions for obtaining transcripts of such awards or marks-sheets for verification. It would also eliminate fraudulent practices such as forging certificates and mark-sheets, by facilitating online verifications thereof. The National Academic Depository aims at ensuring a credible and convenient mechanism for online lodging, verification, and authentication of the academic awards issued by various educational institutions.

The National Academic Depository (www.nad.gov.in) comprises of two interoperable digital depositories viz. CDSL Ventures Limited (CVL) and NSDL Database Management Limited (NDML). These digital depositories have ensured hardware, network facilities, and software of prescribed quality for smooth and secured operationalization of NAD.

The vision of the National Academic Depository (NAD) is born out of an initiative to provide an online storehouse of all academic awards. National Academic Depository (NAD) is a 24X7 online storehouse of all academic awards viz. certificates, diplomas, degrees, mark-sheets, etc. duly digitized and lodged by academic institutions/boards/eligibility assessment bodies. NAD not only ensures easy access to and retrieval of an academic award but also validates and guarantees its authenticity and safe storage.

Benefits of NAD

There are the following benefits for academic institutions, for students and for verification, as-

For academic institutions:

- Permanent and safe record of keeping all academic awards issued.
- No need for issuing duplicate academic awards, students can get it from NAD.
- Effective deterrence to fake and forged paper certificates.
- All academic awards verification needs can be addressed by NAD.
- Efficient, effective and transparent administration.

For students:

Immediate availability of academic awards upon upload by academic institutions.

Online, permanent record of academic awards.

No risk of losing, spoiling, damaging the academic awards.

Anytime, anywhere, and convenient access to academic awards.

For verification Users (Employer Companies, Banks etc.)

- Online, quick, and reliable verification of academic awards (with prior consent of the student concerned)
- Access to authenticated copy of academic awards
- No risk of fake and forged Certificates.
- Reduction in cost, time, and efforts for verification

Roles & Responsibilities of Academic Institutions-

- Enter into SLA with either of the two depositories.
- Provide certificate templates, data masters etc to the depositories.
- Provide data of academic awards for lodging the academic awards on NAD.
- Is responsible for accuracy of data of academic awards.
- Identify staff to be trained in NAD system.
- Edge Awards – Upload awards and seed with Aadhaar / NAD ID.
- Verified & digitally signed data in prescribed formats – maker / checker.
- Data format with certificate template / digitally signed images with data.
- Include student identity with Aadhaar / Unique NAD ID.
- Update Aadhaar / Unique NAD ID in a certificate record.

Roles & Responsibilities of Students

- Register on either of the depositories by providing Aadhar details.
- Avails Unique NAD ID in case of non-availability of Aadhar.
- Submits Aadhaar / Unique NAD ID to AI for verification and seeding into award data.
- Views & accesses all awards online at any time in single account.

- Student can View / download digitally signed awards.
- Request printed copy of the certificate.
- Approve / reject request of any verifier for access to his / her certificate.
- Send copy of certificate to any verifier.

8.12 OPEN GOVERNMENT DATA (OGD) PLATFORM, INDIA

Open Government Data (OGD) Platform India (<https://data.gov.in>) is a platform for supporting Open Data initiative of Government of India. The portal is intended to be used by Government of India Ministries/ Departments their organizations to publish datasets,

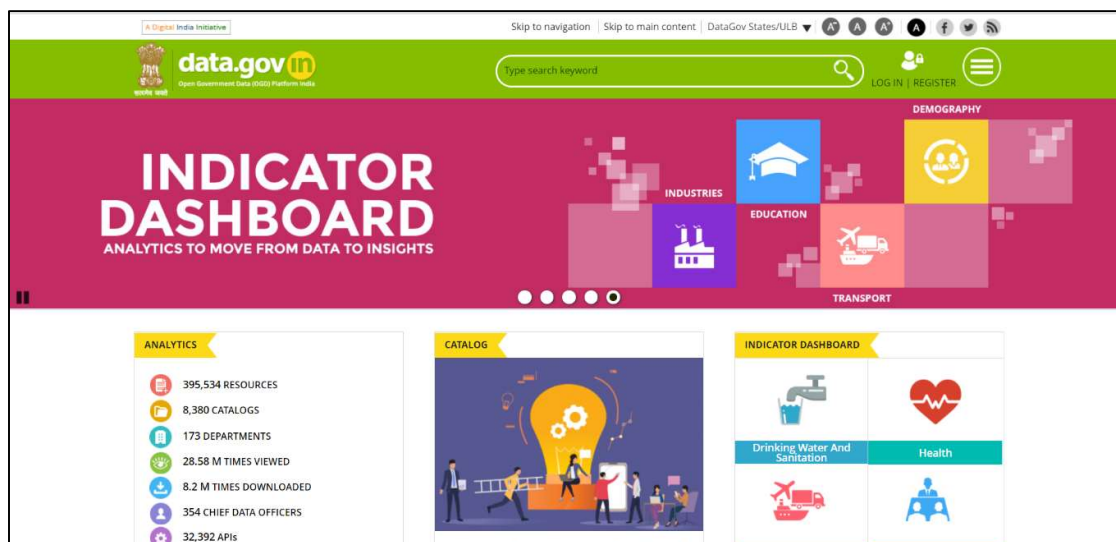


Figure 4 Open Government Data (OGD) Platform India (<https://data.gov.in>)

documents, services, tools and applications collected by them for public use. It intends to increase transparency in the functioning of Government and also open avenues for many more innovative uses of Government Data to give different perspective.

The Open Government Data Platform India is a joint initiative of Government of India and US Government. Open Government Data Platform India is also packaged as a product and made available in Open-source for implementation by countries globally. The entire product is available for download at the Open-source Code Sharing Platform "GitHub".

Open Government Data Platform India has 4 (four) major modules, as detailed below, implemented on a single Drupal instance – An Open-source based Content Framework Solution.

Data Management System (DMS)–

Module for contributing data catalogues by various government agencies for making those available on the front-end website after a due approval process through a defined workflow.

Content Management System (CMS)–

Module for managing and updating various functionalities and content types of the Open Government Data Platform India Platform.

Visitor Relationship Management (VRM)–

Module for collating and disseminating viewer feedback on various data catalogues.

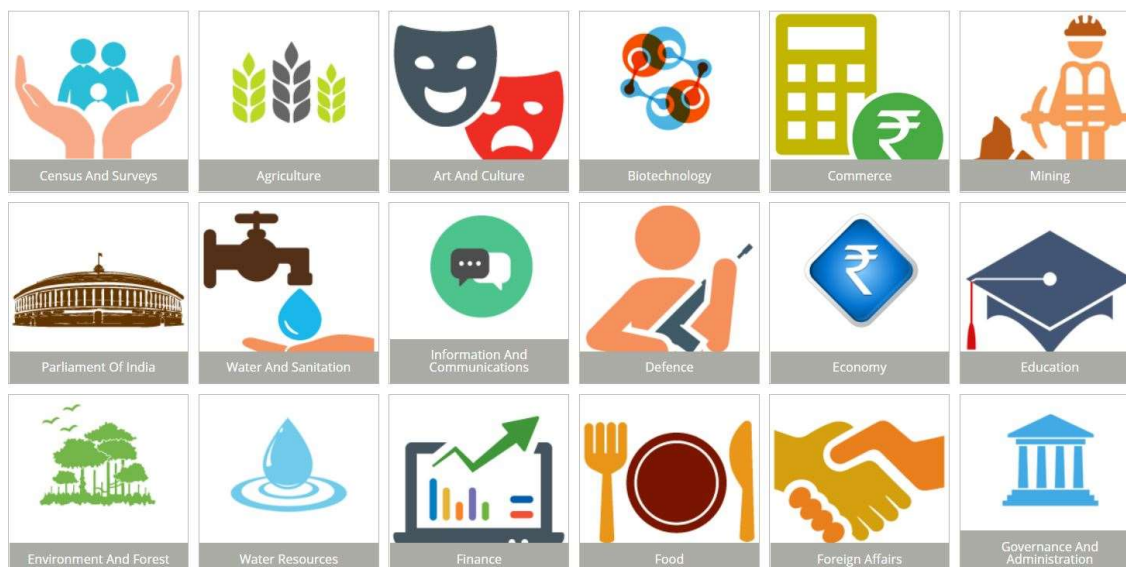


Figure 5 Sample diagram of availability of open data set indicators (<https://data.gov.in>)

Communities–

Module for community users to interact and share their zeal and views with others, who share common interests as that of theirs.

8.13 POINTS TO REMEMBER

- Technology-Enabled Learning like MOOCs offers flexibility with options for learning the content.
- In recent years, Massive open online courses (MOOCs) are one of the most popular trends in education. It represents open access, global, free, video-based instructional content, problem sets, and forums released through an online platform to a high volume of participants aiming to take a course or to be educated.
- The MOOC term firstly appeared in 2008 by Stephen Downes and George Siemens based on the 'connectivist' distributed peer learning model.
- A MOOC is an online course that requires no prior qualifications for entry, can be accessed by anyone who has an Internet connection, and includes large or very large numbers of learners.

- The central and dominant aim of education by ICT and MOOCs is to bring the world to the classroom, to make universally available the services of the finest teacher.
- The terms "cMOOC" and "xMOOC" were coined by Stephen Downes, co-creator of the first cMOOC, to hit the web. Launched in 2008, the course was called "Connectivism and Connective Knowledge."
- cMOOCs are based on the learning theory of Connectivism, which emphasizes the power of networking with other individuals, gleaning from diverse opinions, and focusing on end-goals as the foundation of learning.
- xMOOC stands for eXtended Massive Open Online Course. Instead of being structured as an open online community of learners, xMOOCs are based on a more traditional classroom structure.
- E-repository is a mechanism for managing and storing digital content. E-repositories or Digital repositories may include a wide range of content for a variety of purposes and users.
- A repository can support research, learning, and administrative processes.
- Repositories use open standards to ensure that the content they contain is accessible in that it can be searched and retrieved for later use.
- E-repositories facilitates the development and sharing of digital teaching-learning materials and aids.
- E-repository can be a highly effective from institutions viewpoint and management strategy for achieving the e-learning goals of the institution.
- Ministry of Human Resource Development (MHRD) under its National Mission on Education through Information and Communication Technology (NMEICT) has initiated the National Digital Library of India (NDLI) project to develop a framework of virtual repository of learning resources with a single-window search facility.
- NAD maintains academic awards in an electronic depository which provides benefits to educational institutions, students and employers by enabling online access of academic awards; And also, eliminates the need for persons to approach educational institutions for obtaining transcripts of such awards or marks-sheets for verification.
- Open Government Data (OGD) portal is intended to be used by Government of India Ministries/ Departments their organizations to publish datasets, documents, services, tools and applications collected by them for public use.

8.14 GLOSSARY

- MOOC – MOOC stands for Massive Open Online Course. They typically include collection of many learning objects: video lectures, online readings, problem sets, quizzes, and student interaction.
- SPOC – SPOC stands for a Small Private Online Course. In contrast to MOOCs, SPOCs represent a blended teaching approach that utilizes the power of online platforms in more intimate, traditional course settings.
- xMOOC - xMOOC stands for eXtended Massive Open Online Course. These MOOCs are based on traditional university courses.
- cMOOC - The ‘c’ in cMOOC stands for connectivist, which represents the nature of cMOOCs.
- Rather than being delivered by an individual instructor, as in traditional university courses, cMOOCs involve groups of people learning together.
- FutureLearn - FutureLearn is a platform developed by the UK’s Open University in 2012 that delivers MOOCs.
- Coursera - Coursera is a for-profit platform for online courses developed by Stanford University’s Andrew Ng and Daphne Koller.
- Udacity - Udacity is a for-profit organization developed by Sebastian Thrun, David Stavens, and Mike Sokolsy that offers MOOCs.
- edX - edX is a platform for online learning that provides MOOCs. It was founded as a non-profit with open-source software in 2012 by MIT and Harvard University.
- Pedagogy – Pedagogy refers to the science of education, including the design of learning environments and study of their relative effectiveness. It is also used to define different approaches to teaching and learning, e.g.,’ a connectivist or constructivist pedagogy.
- Constructivism – Constructivism is a theory that argues that learning occurs as a dialogue between prior knowledge and new material.
- OER – OER stands for Open Educational Resources, which refers to free teaching resources, such as documents and media files. Since OERs are openly licensed, they are free and limitlessly distributed.
- VRM– Visitor Relationship Management.
- CMS- Content Management System.
- DMS– Data Management System.
- OGD- Open Government Data.

- NAD- National Academic Depository
- CDSL- Central Depository Services (India) Ltd.
- NITIE- National Institute of Industrial Engineering.
- NSDL- National Securities Depository Limited.
- NPTEL- National Programme on Technology Enhanced Learning.
- SWAYAM- Study Webs of Active-Learning for Young Aspiring Minds.
- NDLI- National Digital Library of India.
- JEE- Joint Entrance Examination.
- NCERT- National Council of Educational Research and Training.
- IISER- Indian Institutes of Science Education and Research.
- IIIT- Indian Institute of Information Technology.
- IISc- Indian Institute of Science.
- IIT- Indian Institute of Technology.
- IIM- Indian Institute of Management.
- NIT- National Institute of Technology.

8.15 CHECK YOUR PROGRESS

Objective type questions-

- a) xMOOC stands for
- b) The 'c' in cMOOC stands for
- c) The full form of OER is
- d) declared 2012 to be the year of the MOOC
- e) The term MOOC was first coined in 2008 by and
- f) Coursera is a fee and governmental MOOC platform. (True/False)
- g) Generally, it seems that MOOCs attract students who already have college degrees. (True/False)
- h) Can MOOCs assist in on-boarding employees? (True/False)
- i) Online learning material sites and MOOCs are the same? (True/False)
- j) SWAYAM is a programme initiated by the Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity, and quality. (True/False)
- k) World's largest course provider
[A] Coursera [B] FutureLearn [C] Udacity [D] mooKIT

- l) Which of following MOOC platform is also provides the courses in Hindi
[A] Unacademy [B] Udacity [C] FutureLearn [D] Coursera
- m) MOOC stand for
[A] Myrind Open online course [B] Media Open Online course
[C] Massive Open Online course [D] Massachusetts Open online course
- n) The statement "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware" refers to
[A] Information Technology (IT) [B] Information and Collaborative Technology (ICT)
[C] Information and Data Technology (IDT) [D] Artificial Intelligence (AI)

Descriptive type questions-

- a) How exactly does a MOOC work?
- b) How long has distance learning been around?
- c) Why are MOOCs valuable for society?
- d) How are MOOCs different from on-demand eLearning?
- e) How long have MOOCs been around in their current form?
- f) What is SWAYAM?
- g) What are the benefits of MOOC participants?
- h) Why should I study a MOOC?
- i) Define the role of Open GOVERNMENT DATA (OGD).
- j) What are the benefits of National Academic Depository (NAD)?
- k) What are the roles & responsibilities of Academic Institutions in terms of NAD?
- l) How can we search resources available on NDLI? Explain.
- m) How many types of resources available on NDLI for their users?
- n) Define the role of e-repositories in terms of e-learning.

Answers (Objective type question)-

[a] eXtended Massive Open Online Course [b] connectivist [c] Open Educational Resources
[d] The New York Times [e] Dave Cormier and Bryan Alexander [f] True [g] True [h] True
[i] False [j] True [k] Coursera [l] Unacademy [m] Massive Open Online course [n]
Information Technology (IT).

8.16 BIBLIOGRAPHY/REFERENCES

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- <https://www.ugc.ac.in/deb/pdf/RecognitionODLInstitutionsHandbook2009.pdf>
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- <https://data.gov.in/>
- <http://ndl.iitkgp.ac.in>
- <https://nad.gov.in/>

8.17 SUGGESTED READINGS

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- Library and Information Science in the Age of MOOCs, IGI Global, By Kaushik, Anna
- Massive Open Online Courses (MOOCs) For Everyone, By Pethuraja.S
- <https://data.gov.in/>
- <http://ndl.iitkgp.ac.in>.
- <https://nad.gov.in/>

UNIT- 9

TECHNOLOGY ENABLED EDUCATION- INSTITUTIONAL INITIATIVES- I & II

9.1 INTRODUCTION

9.2 OBJECTIVES

9.3 ABOUT SAKSHAT PROJECT

9.4 TYPES OF LEARNING RESOURCES AVAILABLE ON SAKSHAT

9.5 A BRIEF INTRODUCTION TO E-PG PATHSHALA

9.6 POINTS TO REMEMBER

9.7 GLOSSARY

9.8 CHECK YOUR PROGRESS

9.9 BIBLIOGRAPHY/ REFERENCES

9.10 SUGGESTED READINGS

9.1 INTRODUCTION

ICT as a tool in education is available to us at this juncture, and we wish to fully utilize it to enhance the current enrollment rate in higher education. The National Mission on Education through ICT, launched in the year 2008, provides a momentous opportunity for all teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner and, thereby, reducing the digital divide. This mission was proposed and planned to make a proper balance between content generation, research in critical areas relating to the imparting of education and connectivity for integrating our knowledge with the advancements in other countries is to be attempted. In this unit, we will briefly discuss the SAKSHAT project and the learning resources available here.

9.2 OBJECTIVES

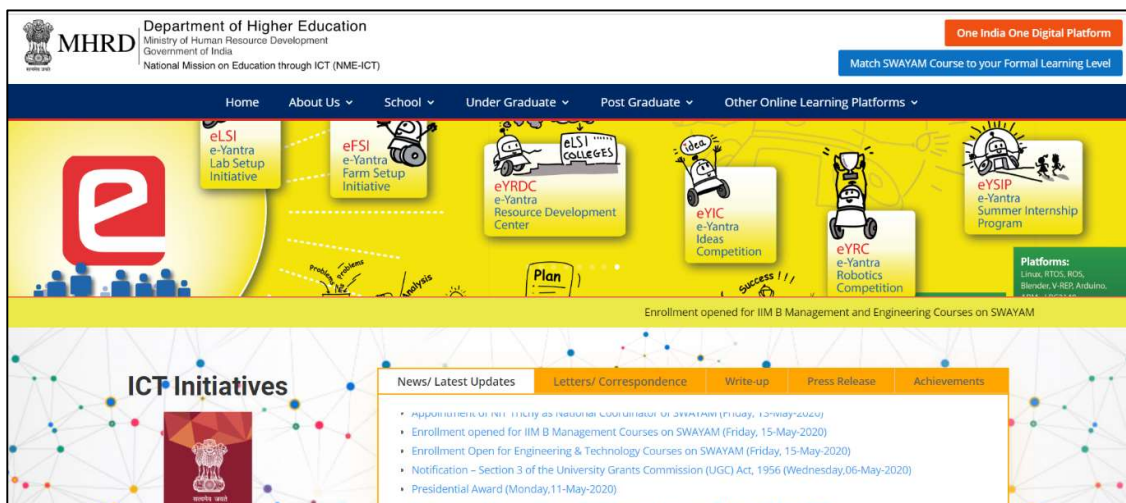
After the successful completion of this unit, you will be able to-

- Define National Mission on Education through ICT.
- Explore the learning resources available on SAKSHAT for different categories of learners.

- Know Govt. of India's massive initiative towards Technology-Enabled Education.

9.3 ABOUT SAKSHAT PROJECT

SAKSHAT project (launched on October 30, 2006) initiated by the Ministry of Human Resource Development (MHRD), Govt. of India, is a one stop solution to facilitate lifelong learning for students, teachers and those in employment or in pursuit of knowledge free of cost to them. The content development task for 'SAKSHAT' was looked after the kind approval of Content Advisory Committee (CAC) for the respective subject, which consisted of representatives from educational institutions like IGNOU, Delhi University, Kendriya Vidyalaya Sangthan (KVS), Navodyaya Vidyalaya Sangthan (NVS), National Institute of Open Schooling (NIOS) and National Council for Educational Research and Training



(NCERT) and prominent academicians in the field.

Figure 6.1 Home page of SAKSHAT (Source: www.sakshat.ac.in)

The project 'SAKSHAT' caters to the learning needs of more than 50 crore people through a proposed scheme of 'National Mission in Education through Information and Communication Technology (NMEICT)'. The portal boldly seeks to address many of the shortcomings in our education system by bringing together the best experts in the country in their respective fields and best available knowledge resources on the web in public domain. It also seeks to standardize curriculum and learning materials across the country and keep them in tune with the latest trend world over so that Indian learners do not lag behind. Teacher- independent modules could work wonders in remote areas where the learner does not have access to good quality teachers or wants to study independently.

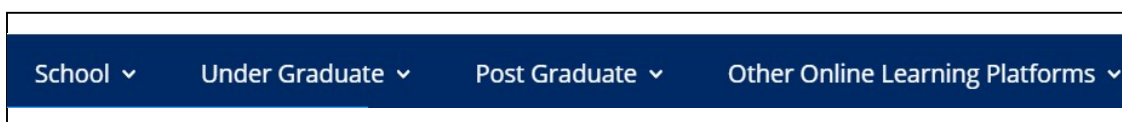
In order to bolster the knowledge resources, to obtain and maintain a competitive edge in the world, we require a system of identification and nurturing of talent and lifelong learning. The knowledge modules should be based on the personalized needs of the learner that would need

to be delivered to him/her at the right time with the right content interactively to take care of the aspirations of the learners.

This mission mode project (NMEICT) seeks the effective utilization of intellectual resources, minimizing wastage of time in scouting for opportunities or desired items of knowledge appropriate to the requirement. Here, we mainly focused on SAKSHAT, which is a one-stop educational portal for pan India. There are several learning resources for the different target groups of learners.

9.4 **TYPES OF LEARNING RESOURCES AVAILABLE ON SAKSHAT**

There are numerous resources available for various kinds aspirant learners, such as- refer the figure 9.2 which shows the menu list e.g., ' School, Under Graduate, Post Graduate and Other



online learning resources.

Figure 9.2 Menu List as per Learning resources on SAKSHAT (Source: www.sakshat.ac.in)

Learning resources available on SAKSHAT for the following categories of learners, As-

[1] School Learners-

In order to find the learning resources for school learners on SAKSHAT portal, there are the following bunch of resources available, e.g., ' Swayam, Swayam Prabha, NDLI, Spoken Tutorial, NISHTHA and etc.

[a] Swayam learning resources for School Learners- Under the Swayam learning resources some of the key learning resources for School learners are-

- Secondary and Senior Secondary (NIOS)- Access link- <http://mooc.nios.ac.in/mooc/>
- NCERT Text books- Access link- <https://epathshala.nic.in//>
- E-Books (I to XII)- Access link- <https://diksha.gov.in/>
- Secondary and Senior Secondary (NCERT)- Access link- https://ciet.nic.in/swayam_courses.php

[b] Swayam Prabha learning resources for School Learners- Under the Swayam Prabha learning resources some of the key learning resources for School learners are-

- Education Channel- Access link- <https://swayamprabha.gov.in/>
- Channel Schedule- Access link- <https://www.swayamprabha.gov.in/index.php/program/current/1>

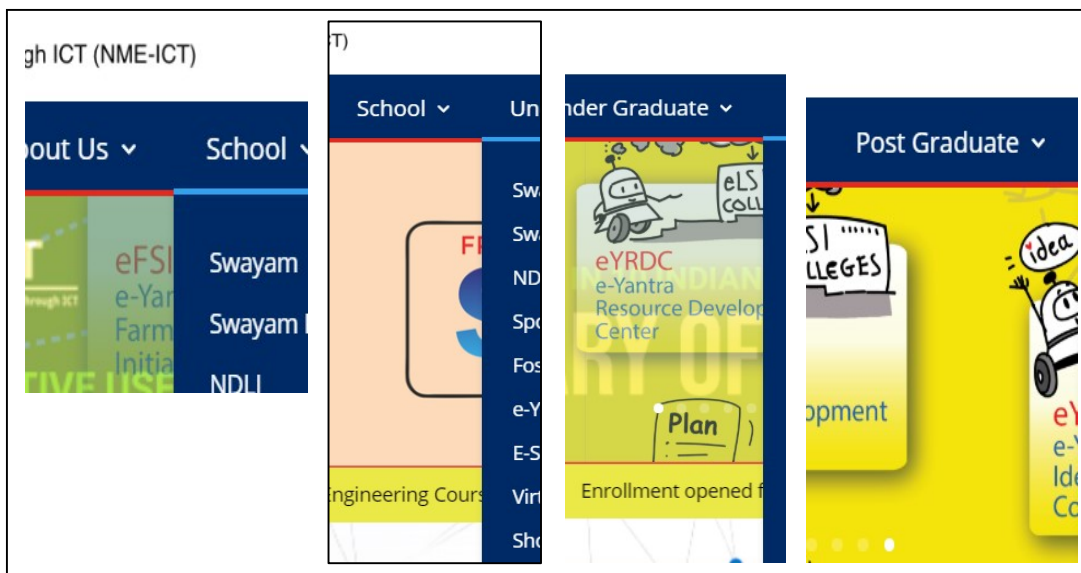
[c] **NDLI learning resources for School Learners-** Under the National Digital Library of India (NDLI) learning resources some of the key learning resources for School learners are-

- Read e-books- Access Link- <https://ndl.iitkgp.ac.in/>

[d] **Spoken Tutorial learning resources for School Learners-** Under the Spoken Tutorial learning resources some of the key learning resources for School learners are-

- Learn Programming- Access Link- <https://spoken-tutorial.org/>

[e] **NISHTHA learning resources for School Learners-** Under the National Initiative for School Heads' and Teachers' Holistic Advancement (NISHTHA) learning resources some of



the key learning resources for School learners are- Access Link- <https://itpd.ncert.gov.in/>

Figure 9.3 List of Learning Resources available on SAKSHAT (Source: www.sakshat.ac.in)

[2] Under Graduate Learners-

In order to find the learning resources for Under Graduate learners on SAKSHAT portal, there are the following bunch of resources available, e.g.,' FOSSEE, e-Yantra, e-Shodhsindhu, Virtual Labs, Shodh Shudhhi, Samarth, Baadal, VIDWAN, e-Gyankosh, Swayam, Swayam Prabha, NDLI and Spoken Tutorial.

[3] Post Graduate Learners-

In order to find the learning resources for Post Graduate learners on SAKSHAT portal, there are the following bunch of resources available, e.g.,' FOSSEE, e-Yantra, e-Shodhsindhu, Virtual Labs, Shodh Shudhhi, Samarth, Baadal, VIDWAN, e-Gyankosh, Swayam, Swayam Prabha, NDLI and Spoken Tutorial.

See below the list of learning resources available at SAKSHAT portal for Under Graduate and Post Graduate (but not limited) as-

[a] Swayam learning resources for Graduate and Post Graduate Learners- Under the Swayam learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Engineering- Access Link- <https://nptel.ac.in/>
- Non- Engineering- Access Link- http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php
- Certificate and Diploma Courses (IGNOU)- Access Link- <http://egyankosh.ac.in/handle/123456789/54865>

[b] Swayam Prabha learning resources for Graduate and Post Graduate Learners- Under the Swayam Prabha learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Education Channel- Access link- <https://swayamprabha.gov.in/>
- Channel Schedule- Access link- <https://www.swayamprabha.gov.in/index.php/program/current/1>

[c] NDLI learning resources for Graduate and Post Graduate Learners- Under the National Digital Library of India (NDLI) learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Read e-books- Access Link- <https://ndl.iitkgp.ac.in/>

[d] Spoken Tutorial learning resources for Graduate and Post Graduate Learners- Under the Spoken Tutorial learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Learn Programming- Access Link- <https://spoken-tutorial.org/>

[e] FOSSEE learning resources for Graduate and Post Graduate Learners- Under the FOSSEE resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- FOSSEE (Free/Libre and Open-source Software for Education)- Access Link- <https://fossee.in/>

[f] E-yantra learning resources for Graduate and Post Graduate Learners- Under the E-yantra resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Learn Robotics- Access Link- <https://www.e-yantra.org>

[g] E-ShodhSindhu learning resources for Graduate and Post Graduate Learners- Under the E-ShodhSindhu resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- E-Journals- Access Link- <https://ess.inflibnet.ac.in>

[h] Virtual Labs learning resources for Graduate and Post Graduate Learners- Under the Virtual Labs resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Scientific Experiments- Access Link- <http://www.vlab.co.in>

[i] Shodh Shudhhi learning resources for Graduate and Post Graduate Learners- Under the Shodh Shudhhi resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Plagiarism Detection Software- Access Link- <https://pds.inflibnet.ac.in>

[j] Samarth learning resources for Graduate and Post Graduate Learners- Under the Samarth resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- E-Government Suit- Access Link- <https://samarth.edu.in>

[k] Baadal learning resources for Graduate and Post Graduate Learners- Under the Baadal resources (initiative of NME-ICT Cloud for academic purpose) some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Free Academic Cloud- Access Link- <https://baadal.nmeict.in/>

[l] VIDWAN learning resources for Graduate and Post Graduate Learners- Under the VIDWAN resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- India Research Information Network System (IRINS)- Access Link- <http://irins.org/irins/>

[m] E-Gyankosh learning resources for Graduate and Post Graduate Learners- Under the egyptankosh resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- India Research Information Network System- Access Link- <http://egyankosh.ac.in>

[n] E-PG pathshala learning resources for Graduate and Post Graduate Learners- Under the e-PG pathshala learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- E-PG Pathshala- Access Link- <https://epgp.inflibnet.ac.in>

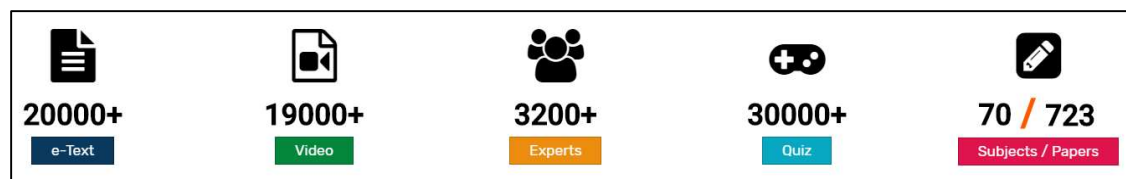
[4] Miscellaneous Learners-

In order to find the learning resources for Miscellaneous learners on SAKSHAT portal, there are the following bunch of resources available, e.g., IIT Bx, IIM Bx, Electronics and ICT Academy, NEAT-AICTE, NROER, DIKSHA, SHAGUN, e-pathshala, Video Conference and LMS. Some of the learning resources with their access link are listed below.

- IIT BombayX- Access Link- <https://www.iitbombayx.in>
- IIM Bx- Access Link- <https://www.iimbx.edu.in>
- Electronics and ICT Academy- Access Link- <http://eict.iitg.ac.in>
- National Educational Alliance for Technology (NEAT)and AICTE- Access Link- <https://neat.aicte-india.org>
- National Repository of Open Educational Resources- Access Link- <https://nroer.gov.in>
- Digital Infrastructure for Knowledge Sharing (DIKSHA)- Access Link- <https://diksha.gov.in/>
- SHAGUN- Access Link- <https://seshagun.gov.in/shagun>
- Epathshala- Access Link- <https://epathshala.nic.in>

9.5 A BRIEF INTRODUCTION TO E-PG PATHSHALA

e-PG Pathshala is an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC. The content and its quality being the key component of education system, high quality, curriculum-based, interactive e-content in 70 subjects across all disciplines of social sciences, arts, fine arts and humanities, natural & mathematical sciences. You can access and explore all the learning resources free of cost.



explore are resources as per your choice.

Figure 9.4 Learning resources available on e-PG Pathshala (Source: <https://epgp.inflibnet.ac.in>)

Note: to access resources on e-PG Pathshala, click on this link- <https://epgp.inflibnet.ac.in>. After clicking on this link, you will get the home page of this website (refer figure 9.5). as-



Figure 9.5 Home page of e-PG Pathshala (Source: <https://epgp.inflibnet.ac.in>)

9.6 POINTS TO REMEMBER

- The SAKSHAT project was launched in the year 2006, initiated by Ministry of Human Resource Development (MHRD), Govt. of India.
- e-PG Pathshala is an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC.
- The SAKSHAT project is one stop solution to facilitate lifelong learning for students, teachers and those in employment or in pursuit of knowledge free of cost to all of them; the access link is- www.sakshat.ac.in
- Content development for the ‘SAKSHAT’ was consisted of the representatives from educational institutions like IGNOU, Delhi University, Kendriya Vidyalaya Sangthan (KVS), Navodyaya Vidyalaya Sangthan (NVS), National Institute of Open Schooling (NIOS) and National Council for Educational Research and Training (NCERT) and prominent academicians in the field.
- The project SAKSHAT contains numerous learning resources for its various kinds of aspirant learners, such as- School learners, Under Graduate learners, Post Graduate learners and other type of miscellaneous learners.

9.7 GLOSSARY

- MHRD- Ministry of Human Resource Development (govt. of India).

- NMEICT-National Mission in Education through Information and Communication Technology.
- UGC- University Grant Commission.
- KVS- Kendriya Vidyalaya Sangthan.
- NVS- Navodyaya Vidyalaya Sangthan.
- NIOS- National Institute of Open Schooling.
- NCERT- National Council for Educational Research and Training.
- NROER- National Repository of Open Educational Resources.
- NEAT- National Educational Alliance for Technology.
- AICTE- All India Council for technical Education.
- IRINS- India Research Information Network System.
- FOSSEE- Free/Libre and Open-source Software for Education.
- NDLI- National Digital Library of India.
- NISHTHA- National Initiative for School Heads' and Teachers' Holistic Advancement.

9.8 CHECK YOUR PROGRESS

Descriptive Type Questions-

- a) Define briefly about the resources available on e-PG pathshala.
- b) List the available learning resources on SAKSHAT under miscellaneous learning resources.
- c) Define the role of SAKSHAT portal in your words.
- d) An engineering aspirant is looking for some learning resources in his/her field. What should be the perfect choice to get resources on the SAKSHAT?
- e) How many types of learning resources available on SAKSHAT? Define briefly.

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- <https://fossee.in/>
- <https://spoken-tutorial.org/>
- <https://ndl.iitkgp.ac.in/>
- <https://swayamprabha.gov.in/>
- http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php
- <https://itpd.ncert.gov.in/>
- https://ciet.nic.in/swayam_courses.php

9.10 SUGGESTED READINGS

- <https://sakshat.ac.in/wp-content/uploads/2020/04/documents/Mission%20Document/Missiondocument.pdf>
- www.sakshat.ac.in

TECHNOLOGY ENABLED EDUCATION- INSTITUTIONAL INITIATIVES- II

9.1	INTRODUCTION
9.2	OBJECTIVES
9.3	BRIEF OVERVIEW OF TECHNOLOGY ENABLED EDUCATION
9.4	BRIEF INTRODUCTION TO SHODHGANGA-INFLIBNET
9.5	BRIEF DESCRIPTION OF RESOURCES AVAILABLE AT INFLIBNET
9.6	BRIEF OVERVIEW TO NCERT E-INITIATIVES
9.7	POINTS TO REMEMBER
9.8	GLOSSARY
9.9	CHECK YOUR PROGRESS
9.10	BIBLIOGRAPHY/ REFERENCES
9.11	SUGGESTED READINGS

9.1 INTRODUCTION

From the development of the Internet in 1980s and the invention of the World Wide Web in 1995, there has been considerable growth in the adoption of technology within educational institutions, for both distance and on-campus teaching and learning. The adoption of technologies has now spread, to a greater or lesser extent, to almost all parts of the world. Technology-Enabled Education is taken to refer to the application of some form of digital technology to teaching and/or learning in an educational context.

9.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Explore Institutional Initiatives of Technology Enabled Education.
- Define the Shodhganga initiatives.
- Explore e-resources available under Inflibnet, and NCERT.

9.3 BRIEF OVERVIEW OF TECHNOLOGY ENABLED

EDUCATION

The term Technology-enhanced Education (TEE) is used to describe the application of technology to teaching and learning. It is a broad category that isn't particularly defined, but, in short, TEE is any technology that enhances the learning or teaching experience. The term can be used to describe both analog and digital technologies, but more recently, we see that digital TEE is taking over education in the form of different types of educational software. TEE is transforming and enhancing education and educational institutions beyond recognition. Therefore, it is impossible to be ignored! Let's explore why TEE is important for educators. Technology-Enhanced Education is important for many reasons. It is not only important because it is the standard of education that is expected today, but it can also improve education. This section explores TEE's importance in more detail. As-

- Students can learn at their own pace- Technology in education enables children to adjust to their own pace of learning. Students who need extra time can spend more time going over exercises until they understand, whilst students who need less support can continue ahead. It also frees up the teacher to help kids who need more support on an individual level.
- More resources- With TEE, educators are no longer limited to the textbooks that their institutions provide. By using other resources such as video, audio, and interactive learning, students have many different ways to learn. Teachers can find creative ways to teach their students in an engagingly. Technology has changed the learning environment so that learning is more hands-on.
- Technology keeps kids engaged- Children often struggle to stay on task or interested, particularly if it is not interactive. TEE can make school tasks more engaging, which will help your students to stay focused.
- Technology is necessary to succeed in the real world- The reality is that it is almost impossible to survive the working world without technology. Therefore, it is better if children learn how to use tech sooner rather than later. Arguably, being computer literate is more important than some of the more traditional skills that are taught in schools.

In India, Department of Higher Education, Ministry of Education is administering a programme 'National Mission on Education through Information and Communication Technology' (NMEICT) to leverage the potential of ICT to make the best quality content accessible to all learners in the country, free of cost.

9.4 BRIEF INTRODUCTION TO SHODHGANGA- INFLIBNET

All the theses and dissertations are the rich and unique source of information, often the only source for research work that does not find its way into various publication channels. As such, theses and dissertations remain an un-tapped and under-utilized asset, leading to unnecessary duplication and repetition that, in effect, is the anti-ethics of research and wastage of huge resources, both human and financial. The UGC Notification (Minimum Standards & Procedure for Award of M.Phil./ Ph. D Degree, Regulation, 2009 and amendment made on 5th May 2016 mandates submission of electronic version of theses and dissertations intending to facilitate its open access to the academic community world-wide. Online availability of electronic theses through centrally maintained digital repository not only ensures easy access and archiving of Indian doctoral theses but also helps in raising the standard and quality of research. The open access to theses and dissertations would overcome the serious problem of duplication of research and poor quality resulting from the “poor visibility” and the “unseen” factor in research output. As per the Regulation, the responsibility of setting-up, hosting and maintaining the digital repository and making it accessible to all institutions and universities, is assigned to the INFLIBNET Centre. Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations (ETD) set-up by the INFLIBNET Centre as per UGC notification 2009/2016. Shodhganga stands for the reservoir of Indian intellectual output stored in a repository hosted and maintained by the INFLIBNET Centre. The word "Shodh" originates from Sanskrit and stands for research and discovery, Ganga is a holy and popular river with its root in Indian culture and civilization.

Shodhganga- INFLIBNET Centre

The Shodhganga centre is setup using DSpace, an open-source digital repository software, initially developed by MIT and HP, now updated and maintained by DuraSpace, a non-profit Organization. The DSpace uses internationally recognized protocols and interoperability standards. The Shodhganga INFLIBNET Centre 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 can capture, index, and store, disseminate and preserve ETDs submitted by the researchers. Shodhganga Repository at INFLIBNET replicates the academic structure of each university in terms of Departments/Centres and Colleges each university has. This structure facilitates research scholars from universities to deposit their theses in the respective Department / Centre/ College.



URL- <https://shodhganga.inflibnet.ac.in>

Features of Shodhganga-

- Open access repository of Indian theses for world-wide access;
- Customized ingestion interface for ease of submission of theses using DSpace;
- Integration with Theses Database of IndCat (with 2.74 Lakh bibliographic data); and
- Multi-lingual support for theses hosted in the repository. Hindi, Gujarati, Tamil, Sanskrit, Malayalam, Urdu, Marathi already enabled.

9.5 **BRIEF DESCRIPTION OF RESOURCES AVAILABLE AT INFLIBNET**

Information and Library Network (INFLIBNET) Centre, Gandhinagar is an Autonomous Inter-University Centre (IUC) of University Grants Commission, New Delhi (Ministry of Education, Govt. of India). It is a major National Programme initiated by the UGC in March 1991 as a project under the IUCAA; it became an independent Inter-University Centre in June 1996. INFLIBNET is involved in modernizing university libraries in India using the state-of-art technologies for the optimum utilization of information. The technology being a driving force in the contemporary education system, the Centre has taken-up several initiatives for the benefit of the academic community in India. These initiatives are categorized into various phenomenon's as mentioned below:

1-Library Automation-

INDCAT-Union Catalogue of Indian Universities (IndCat) is a by-product of the library automation of the INFLIBNET Centre wherein universities that are signatory to the MoU on library automation contribute the bibliographic records of documents that are available in their libraries. The scope of the IndCat has now been extended to invite contributions from

universities and other institutions that have not signed MoU with INFLIBNET Centre on library automation.

SOUL 2.0-The SOUL 2.0 (Software for University Libraries) is state-of-the-art integrated library management software designed and developed by the INFLIBNET Centre based on requirements of colleges, universities and other academic libraries. The software is compliant to international standards for bibliographic formats and circulation protocols. It is compliant to international standards such as MARC 21 for the bibliographic format, Unicode based Universal Character Sets for multilingual bibliographic records and NCIP 2.0 and SIP 2 based protocols for RFID, electronic surveillance and control.

2- E-Consortium

E-SHODHSINDHU-e-ShodhSindhu is an initiative of Consortium for Higher Education Electronics Resources by Ministry of Education. It provides access to e-resources (10000+ full-text journals, 164300+ e-Books and 4 databases through e-ShodhSindhu and 600000 e-Books through NDL) to Universities, Colleges and Centrally Funded Technical Institutions in India.

N-LIST-The Project entitled "National Library and Information Services Infrastructure for Scholarly Content (N-LIST)", graduated as a regular scheme of UGC under UGC-INFONET Digital Library Consortium as college component, is merged into e -ShodhSindhu: Consortia for Higher Education E-Resources. The N-LIST provides access to 6,000+ journals, 1,64,300+ ebooks under N-LIST and 6,00,000 ebooks through NDL to all Govt., Govt.-aided as well as non-aided colleges through a proxy server / shibboleth.

INFISTATS-The Centre has developed a software called InfiStats, for monitoring the usage statistics of various e-resources made accessible to the member institutions. The InfiStats portal imports the usage data from the publisher's website automatically and store it in a database on InfiStats platform. The InfiStats interface provides title-level COUNTER-compliant reports to member institutions. The member institutions can also log-on to this portal for monitoring the usage of their respective e-resources.

INFED-INFLIBNET Access Management Federation (INFED) was setup which uses Shibboleth, standard-based open-source software, for authenticating authorized users from colleges and universities and provide them seamless access to e-resources from anywhere, anytime. Shibboleth offers a mechanism for users to access multiple resources within a federated single sign-on framework.

SHODHSHUDDHI-The Govt. of India was to provide Plagiarism Detection Software to all Indian Universities/Institutions including Central Universities, State Universities, deemed to be Universities, Private Universities, Centrally Funded Technical Institutions (CFTIs), Institute of National importance (INIs), Inter University Centres of UGC (IUCs). The

INFLIBNET Centre is a nodal agency to execute the project/initiative under the aegis of Ministry of Education.

INFISTATS-The Centre has developed software called InfiStats, for monitoring the usage statistics of various e-resources made accessible to the member institutions. The InfiStats portal imports the usage data from the publisher's website automatically and store it in a database on InfiStats platform. The InfiStats interface provides title-level COUNTER-compliant reports to member institutions. The member institutions can also log-on to this portal for monitoring the usage of their respective e-resources.

3-OPEN ACCESS INITIATIVE

SHODHGANGA-Shodhganga is a digital repository set-up for submission of electronic versions of theses and dissertations by students / research scholars in universities in India and makes them available in open access to the world-wide academic community in response to the UGC Notification (Minimum Standards & Procedure for Award of M.Phil. / Ph.D Degree, Regulation, 2009 and amendment made in 2016) where-in the responsibility of maintaining the digital repository of Electronic Theses and Dissertations (ETDs) is assigned to the INFLIBNET Centre.

SHODHGANGOTRI-Under this initiative, research scholars/research supervisors in universities could deposit an electronic version of approved synopsis submitted by research scholars to the universities for registering themselves under the PhD programme. Synopses in Shodhgangotri would later be mapped to full text thesis in Shodhganga. As such, once the full-text thesis is submitted for a synopsis, a link from the synopsis in Shodhgangotri to the full-text theses in Shodhganga will be provided.

INSTITUTIONAL REPOSITORY-The Centre has established an institutional repository called IR@INFLIBNET using DSpace, opensource software. The papers published in the proceedings of the CALIBER and PLANNER is uploaded into the repository. The Repository also includes course materials, newspaper clippings, etc.

INFOPORT-INFOPORT: INFLIBNET Subject Gateway for Indian Electronic Resources is designed to facilitate registering of an Internet resource into the portal and extending its access to users. INFOPORT supports browsing of Internet resources by Dewey Decimal Classification (DDC) Scheme.

RESEARCH PROJECT DATABASE-The Research Project Database provides details of completed and ongoing projects carried out by faculty members working in universities and institutions across the country. The Centre gets project details along with the project reports in print/digital formats from the project investigators of Minor Research Projects (MRP) funded by the UGC.

9.6 BRIEF OVERVIEW TO NCERT E-INITIATIVES

The National Council of Educational Research and Training (NCERT) is an autonomous organisation set up in 1961 by the Government of India to assist and advise the Central and State Governments on policies and programmes for qualitative improvement in school education. The major objectives of NCERT and its constituent units are to: undertake, promote and coordinate research in areas related to school education; prepare and publish model textbooks, supplementary material, newsletters, journals and develops educational kits, multimedia digital materials, etc. organise pre-service and in-service training of teachers; develop and disseminate innovative educational techniques and practices; collaborate and network with state educational departments, universities, NGOs and other educational institutions; act as a clearing house for ideas and information in matters related to school education; and act as a nodal agency for achieving the goals of Universalization of Elementary Education. In addition to research, development, training, extension, publication and dissemination activities, NCERT is an implementation agency for bilateral cultural

exchange programmes with other countries in the field of school education.

Website- www.ncert.nic.in

DIKSHA (www.diksha.gov.in)-

DIKSHA (Digital Infrastructure for Knowledge Sharing) is a national platform for school education, an initiative of National Council for Education Research and Training (NCERT), MHRD. DIKSHA was developed based on the core principles of open architecture, open

access, open licensing diversity, choice and autonomy as outlined in the Strategy and Approach Paper for the National Teacher Platform released by the government in May, 2017. DIKSHA itself was launched by the Hon' Vice President of India on Sept 5th, 2017 and has since been adopted by 35 states/UT's across as well as CBSE and NCERT and by crores of learners and teachers.

DIKSHA is built on open-source technology, made in India and made for India, which incorporates internet scale technologies and enables several use-cases and solutions for teaching and learning. DIKSHA is built using MIT licensed open-source technology called Sunbird, which is a digital infrastructure for learning and is designed to support multiple languages and solutions and offers over a 100 micro services as building blocks for the development of platforms and solutions.

DIKSHA, as mentioned earlier, is available for the use of all states and UTs of India. Each state/UT leverages the DIKSHA platform in its own way, as it has the freedom and choice to use the varied capabilities and solutions of the platform to design and run programs for their teachers and learners. DIKSHA policies and tools make it possible for the education ecosystem (educationist, experts, organizations, institutions - government, autonomous institutions, non-govt and private organizations) to participate, contribute and leverage a common platform to achieve learning goals at scale for the country.

DIKSHA can be accessed by learners and teachers across the country and currently supports 18+ languages and the various curricula of NCERT, CBSE and SCERTs across India. The platform is being leveraged and developed for school education, foundational learning programs and to support inclusive learning for underserved and differently-abled communities of learners and teachers.

NROER (www.nroer.gov.in)-

NROER (National Repository of Open Educational Resources) is a collaborative platform, which brings together everyone interested in school and teacher education. Initiated by the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India and managed by the Central Institute of Educational Technology, National Council of Educational Research and Training, the Repository runs on the MetaStudio platform, an initiative of the Knowledge Labs, Homi Bhabha Centre for Science Education.

NISHTHA (National Initiative for School Heads' and Teachers' Holistic Advancement)-

(www.itpd.ncert.gov.in)

NISHTHA is a capacity building programme for "Improving Quality of School Education through Integrated Teacher Training". It aims to build competencies among all the teachers and school principals at the elementary stage. The functionaries (at the state, district, block,

cluster level) shall be trained in an integrated manner on learning outcomes, school-based assessment, learner- centre pedagogy, new initiatives in education, addressing diverse needs of children through multiple pedagogies, etc. This is being organized by constituting National Resource Groups (NRGs) and State Resource Groups (SRGs) at the National and the State level who will be training 42 lakhs teachers subsequently. A robust portal/Management Information System (MIS) for delivery of the training, monitoring and support mechanism has been infused with this capacity building initiative.

ePathshala (www.epathshala.nic.in)

ePathshala is a portal/app developed by the CIET, and NCERT. It was initiated jointly by the Ministry of Human Resource Development, CIET, and NCERT, and launched in November 2015. It hosts educational resources for teachers, students, parents, researchers and educators, can be accessed on the Web, and is available on Google Play, App Store and Windows. The content is available in English, Hindi and Urdu.

The platform offers a slew of educational resources, including NCERT textbooks for classes 1-12, audio-visual resources by NCERT, periodicals, supplements, teacher training modules and a variety of other print and non-print materials. These materials can be downloaded by the user for offline use with no limits on downloads. The app supports flip book format to provide a more realistic experience.

Tamanna- (Try and Measure Aptitude and Natural Abilities)

(www.ncert.nic.in/tamanna)

Under the aegis of Ministry of Human Resource Development, Govt. of India, the Central Board of Secondary Education (CBSE) and National Council of Educational Research and Training (NCERT), New Delhi have developed Tamanna - An Aptitude Test for Senior School Students to enable stakeholders know the aptitude of students of classes IX and X. Details about use of aptitude test, dimensions measured in the test, construction and standardization of the test, administration and scoring and understanding the meaning of aptitude test scores are available in the test manual. As a collaborative work, piloting of the aptitude test was done by the CBSE with 17,000 students studying in classes IX and X through its affiliated schools across different parts of the country.

e-Kalpa

An integrated android based mobile app ‘e- kalpa’ enabling technology delivery, interactive learning and real time data recording was developed for better reaching out to farming communities. It has GPS enabled platform, developed to connect stakeholders of plantation sector with emphasis to coconut, arecanut and cocoa. e-kalpa is the integration of five major services viz., farmers issue reporting and supporting, synchronized farming, farmer diary, knowledge base and notifications and is available in English, Hindi, Malayalam and Kannada

languages. It provides the farmer, latest CPCRI technologies and farming practices for increasing yield. It has online reporting facility for any type of issues related on farming which needs immediate solutions from experts.

e-Yantra (www.e-yantra.org)

e-Yantra is a robotics outreach project, an initiative of the Department of Computer Science and Engineering at the Indian Institute of Technology, Bombay (IIT Bombay). It is funded by the Ministry of Education, Government of India, under the National Mission on Education through ICT (NMEICT). The goal of e-Yantra is to complement existing Higher Education systems worldwide and solve local problems across a variety of domains such as: Agriculture, Disaster, Manufacturing Defense, Home, Smart Cities and Service Industries through technology. The mission of this project is to create the next generation of engineers with a practical outlook to help in providing pragmatic solutions to real-world problems. The initiative seeks to provide hands-on learning-infrastructure to engineering students who have limited access to labs and mentors.

9.7 POINTS TO REMEMBER

- Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations (ETD) set-up by the INFLIBNET Centre as per UGC notification 2009/2016.
- Information and Library Network (INFLIBNET) Centre, Gandhinagar is an Autonomous Inter-University Centre (IUC) of University Grants Commission, New Delhi (Ministry of Education, Govt. of India).
- The National Council of Educational Research and Training (NCERT) is an autonomous organisation set up in 1961 by the Government of India to assist and advise the Central and State Governments on policies and programmes for qualitative improvement in school education.

9.8 GLOSSARY

- Tamanna- Try And Measure Aptitude And Natural Abilities.
- NCERT- National Council of Educational Research and Training.
- NISHTHA- National Initiative for School Heads' and Teachers' Holistic Advancement.
- NROER- National Repository of Open Educational Resources.
- DIKSHA- Digital Infrastructure for Knowledge Sharing.

9.9 CHECK YOUR PROGRESS

- a) How do you define technology enabled learning initiatives by several institutions for one's overall learning enhancement?

- b) List the various e-resources under Inflibnet.
- c) How e-educational initiatives of NECRTs' are beneficial for teacher's development? Explain.
- d) List 5 key characteristics of DIKSHA.

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UNIT- 10

VIDEO CHANNEL MANAGEMENT (YOUTUBE)- TOOLS AND ACTIVITIES- I & II

10.1	INTRODUCTION
10.2	OBJECTIVES
10.3	YOUTUBE CHANNEL: AN OVERVIEW
10.4	BENEFITS OF YOUTUBE CHANNEL
10.5	TYPES OF YOUTUBE CHANNEL
10.6	YOUTUBE MARKETING: OVERVIEW
10.7	CHANNEL MANAGEMENT
10.8	POINTS TO REMEMBER
10.9	GLOSSARY
10.10	CHECK YOUR PROGRESS
10.11	BIBLIOGRAPHY/ REFERENCES
10.12	SUGGESTED READINGS

10.1 INTRODUCTION

YouTube is a video-sharing platform which was started on February 14, 2005, by Steve Chen, Chad Hurley, and Jawed Karim, former employees of the PayPal. Its Headquarter in San Bruno, California. The first YouTube video ME AT THE ZOO was uploaded, and Google announced it was paying \$1.65billion for the service. YouTube is a platform where user can watch, share, upload, like and comment the videos. It was officially launched in December 2005.

Now YouTube is most popular site and application, with user watching around 6 billion hours of video every month. Features of YouTube are following:

- User can upload videos, comments and make a playlist.
- User can create a personal YouTube channel

- Like, comment and share other videos.
- User can subscribe another channel.
- YouTube is used around in 81 countries and available in 76 languages.

The Massive YouTube Ecosystem



YouTube is so popular because you can find number of videos and all the content is user-generated. On an average, 130 hours of videos are uploaded to YouTube every minute, so there's always something new to watch! And YouTube isn't a one-way street you can jump in, record and share your own videos, and become a part of the community.

And other video sites have decent levels of traffic, most businesses could start today on YouTube and do fine because it's far from saturated. Many businesses are actually investing in YouTube marketing.

Now a days person knows how to do the smart business. If you've been considering marketing on YouTube, or you've just started and haven't really found your feet, this course is especially for you. You want to build a successful YouTube channel? Then organize all your ideas at one place. This course will tell you all the key components of creating a YouTube channel, how to get views, and those views will lead to subscribers and sales for your business.

10.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Explore the types of YouTube channels one can create.
- Define the benefits of having a YouTube channel for business purposes.

- Understand YouTube channel management.

10.3 YOUTUBE CHANNEL: AN OVERVIEW

Channels are one of the coolest parts of YouTube, that provides quick access to all videos. YouTube channel is a spotlight for uploading video, comment, or to make playlist. However, without YouTube channel you have no public presence. YouTube channel is like a homepage, where user can organize the videos or arrange the playlist. User can customize their channel with logos, graphics, pictures and text description.

With help of Google Account, you can watch the videos and subscribe the channels. However, without a YouTube channel, you have no public presence on YouTube. Even if you have a Google Account, for upload videos, comment, or make playlists you need to create YouTube channel. You can create your channel on either the YouTube mobile site or YouTube website.

10.4 BENEFITS OF YOUTUBE CHANNEL

As we know social media post are not enough for growing a business, we need new strategy for increasing a traffic towards our website. YouTube introduce new strategy for promoting business through attractive videos at low cost or free. Benefits of YouTube Channel are:

- If you post a video on your channel, it automatically finds on Google.
- As YouTube is the second largest search engine, through which audience can easily reach you, by creating attractive videos or advertising their business on other people channel.
- It helps to enhance the talent of the any artist.
- The content never dies, you can re-purpose content you have already created. Using YouTube for business can help you to re-purpose content you've already created without wasting lot of time or invest on expensive equipment's.
- Through YouTube advertisement, you can reach a worldwide user.
- Videos are better to attract user.
- YouTube is an easy platform where user can upload videos and manage their account.
- You can associate your domain name with YouTube channel.
- YouTube viewer sees your video ad in another video and clicks on it.

10.5 TYPES OF YOUTUBE CHANNELS

YouTube platform provides users to create different types of channels. Anyone can create a video about any topic. Though it can be classified in following categories:

- **ANIMATION:** YouTubers can create entire animated stories using self-made digital images and dialogues. The YouTubers publish short videos that each depicts a story. These videos include poems and comic stories for kids.
- **BEAUTY:** Beauty YouTubers are known for their expertise on the subjects of makeup and skincare routine. As trendsetters within the beauty industry, they often set a precedent for what brands and products will be most popular. Mostly beauty YouTubers are self-taught and viewers value their skills and candid opinions about the latest beauty products.
- **COMEDY:** Comedy YouTubers are known for poking fun at everyday human problems, create original characters, skit and publish their content with the intention of making people laugh. They separate the content according to the topic and top comedy YouTubers are self-deprecating and have excellent observational skills.
- **COOKING:** Many YouTubers specialize in one specific cuisine or type of food. They teach viewers how to prepare meals through guided tutorials. Other creators focus on easy to prepare meals, extravagant meals and healthy meals. They are an excellent source of new recipes.
- **DAILY VLOGGERS:** Daily vloggers are some of the most consistent creators on YouTube, publishing a video every day. They mainly use two camera angles to capture their daily life where one camera faces the outward and the other is selfie style. It includes two abilities to create a vlog that's the ability to create a compelling storyline out of seemingly ordinary events and the ability to provide engaging, improvised commentary as they film. The best daily vloggers feel like close friends.
- **DESIGN AND ART:** Design/art YouTubers are those that create videos showcasing their art expertise and help others to improve their artistic skills. Creators within the group explore many different mediums, including traditional drawing, digital drawing, graphic design, and painting.
- **DIY:** DIY (Do It Yourself) YouTubers teach viewers how to make customized items instead of buying them ready-made. A DIY video might teach audiences how to embellish their jeans, decorate their phone case.
- **FASHION:** These YouTubers fit in the fashion category specialize in clothing and accessories. Fashion YouTubers create content in line with their personal style, such as classic, eclectic, or modern.
- **GAMING:** Gaming YouTubers are those that create content focused on video games. They help viewers improve their skills and provide entertainment to a gaming-focused audience. The video format most commonly produced by gaming YouTubers is

the let's play video. This is when a YouTuber records their screen while playing a video game and provides additional commentary.

- **HEALTH AND FITNESS:** These YouTubers detail their workout routines and diets for audiences in an effort to inspire others to lead a healthier lifestyle. Some post full-length workout videos that viewers can take with them to the gym or complete in the comfort in their own home. Others post short clips that guide viewers through quick workouts or new exercises.
- **MUSIC AND DANCE:** YouTube musicians, dancers, singers/songwriters, Choreographers comes under this category. Those who specialize in music usually publish either covers of popular songs, original compositions, or a combination of both. Creatives in dance often share choreographed routines and dance tutorials. YouTube has launched the careers of many stars and has become a destination for discovering new talent.
- **PRANKS/CHALLENGES:** YouTube creators that specialize in pranks and/or challenges shock and humor audiences. Prank YouTubers do so by tricking friends and bystanders. Challenge YouTubers attempt daring feats, like eating unusual foods. Prank/challenge videos are often the most watched and shared videos on YouTube. This kind of YouTuber publishes content that appeals to people of all ages and backgrounds.
- **PRODUCT REVIEW:** There is a clear trend, nowadays, for people to turn to the internet when they are considering making a purchase. They want to discover what other people think about products that interest them. These YouTubers specialize in the ratings, review, quality and everything about the product.
- **SPORTS:** YouTube hosts a collection of professional sports highlights, hilarious sports blunders, and even motivational sports videos. Creators within the sports category celebrate the topic of athletics, and either post videos focused on a specific sport or many. If a sports YouTuber focuses on a single sport, content might include product reviews and skill tutorials. Other channels incorporate multiple sports by guest starring professional athletes and performing trick shots and challenges.
- **TECH:** Technology YouTubers build their following on the basis of one subject: technology. Tech YouTubers also have a strong eye for detail. Their knowledge of technology allows them to compare new technology to previous models and make critical judgments on the value of upgrades.
- **TRAVEL:** As YouTube has grown the platform has become a hub for first-hand travel and adventure knowledge. Previously, individuals relied primarily on websites and books to plan vacations.travel YouTubers divide their content according to location or

attraction. Depending on the creator they might present their travel experiences through highlight videos or through detailed vlogs.

10.6 YOUTUBE MARKETING

YouTube Marketing is the practice of promoting businesses and products on YouTube's platform, by uploading valuable videos on a company's YouTube channel or using YouTube advertisements. For online and offline Business owners and internet marketers, YouTube Marketing is an essential strategy to take advantage of the web's massive shift toward video.



The most effective tools of business lead generation are video marketing. YouTube marketing is a tool for brands. That's why we've created this complete guide for YouTube pros. Video has proven itself as one of the best-performing forms of content, and just because you're creating them for YouTube doesn't mean that you can't repurpose your videos. By video marketing you have a better chance to promote your business sales. Marketing on YouTube means marketing on another social platform.

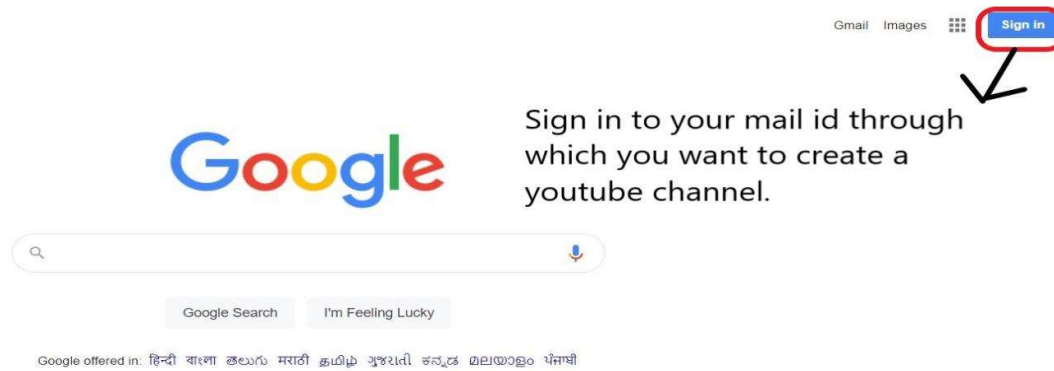
10.7 CHANNEL MANAGEMENT

YouTube is an easy and robust way to increase the business reach to millions of users across the globe. So, the YouTube channel must be properly managed to engage its subscribers and provide the best content to its users.

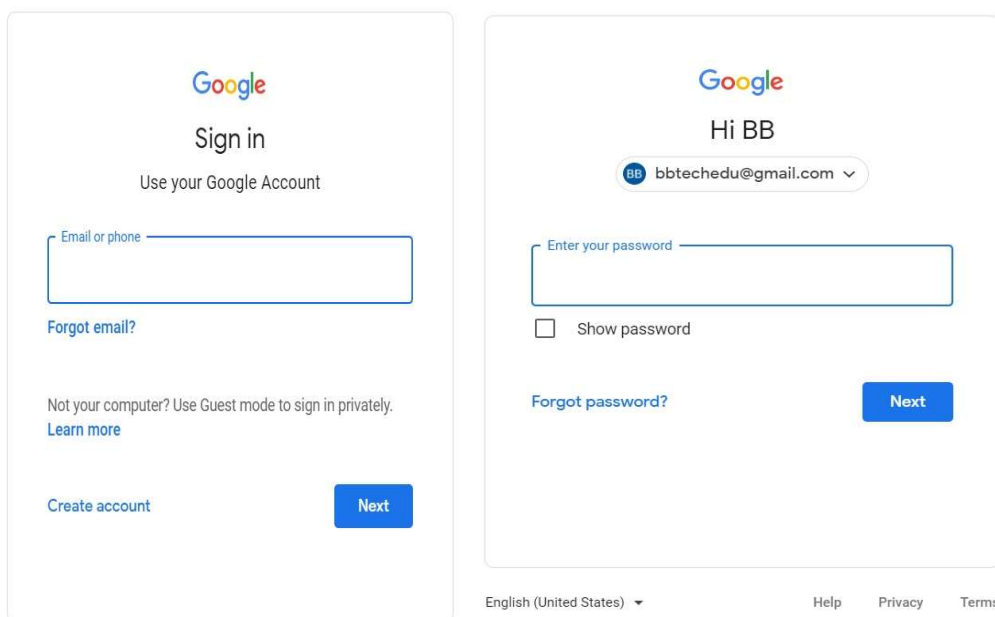
Creating A Channel

To create a channel on YouTube, you must have an account on google. Here are the steps to create a YouTube Channel:

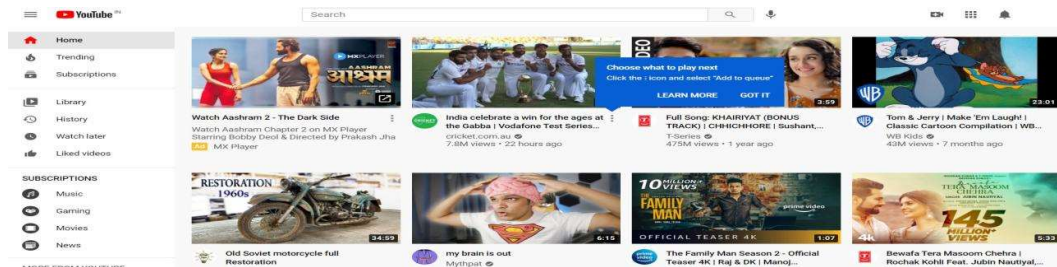
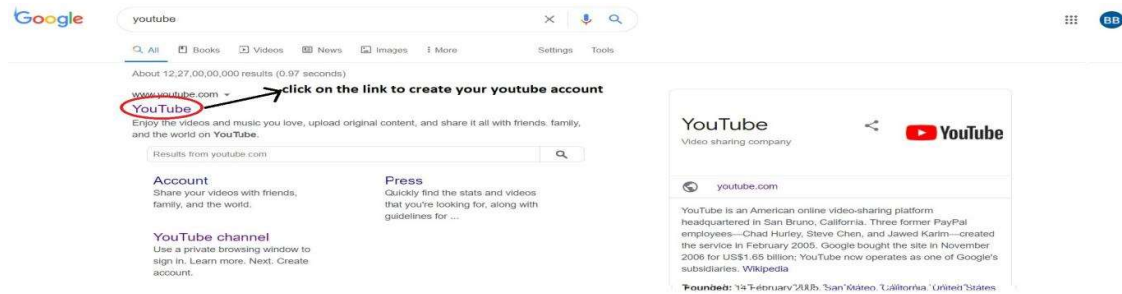
- Sign in to your Google account



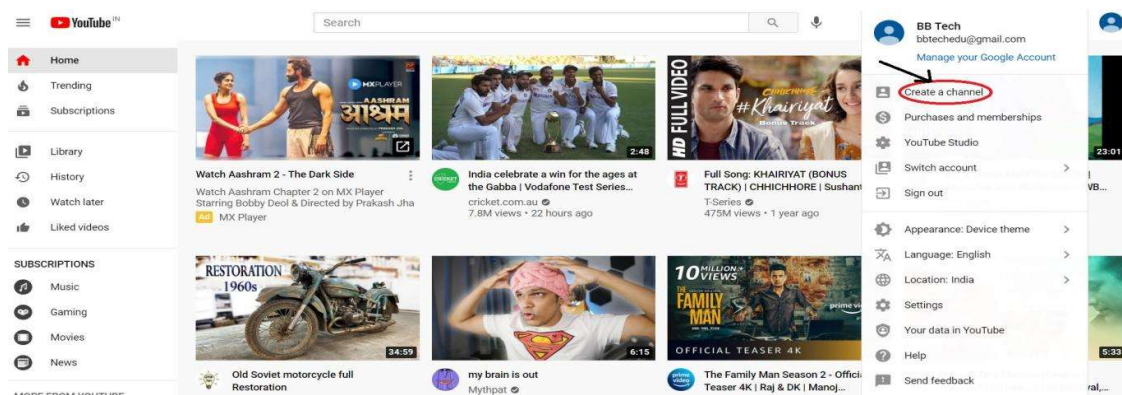
- After clicking on sign-in button, this page will open. Here you must add your email address and password



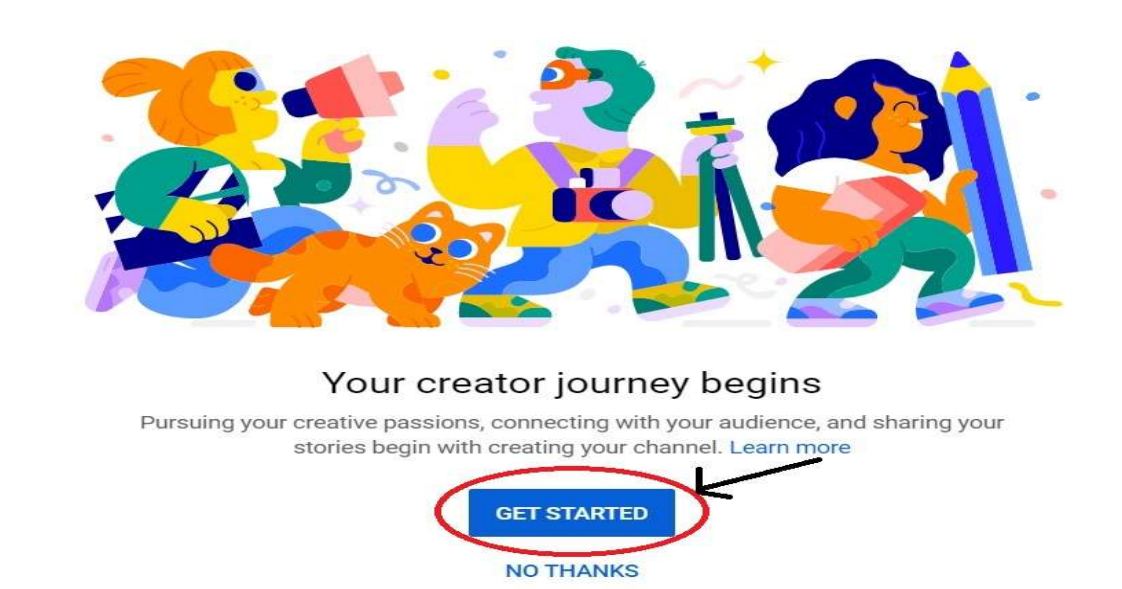
- After sign-in, click on the YouTube link through google chrome.



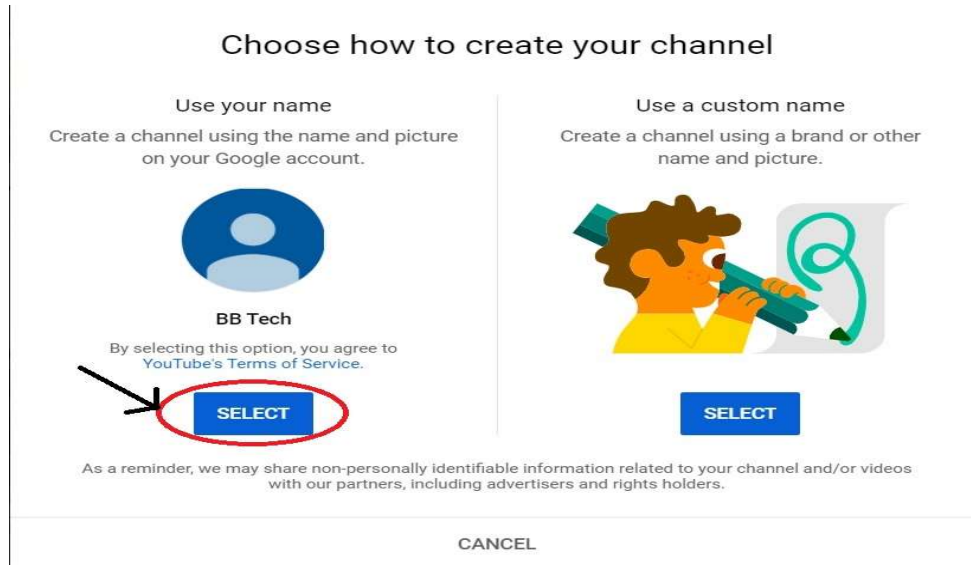
● Select the “Create a channel” option.



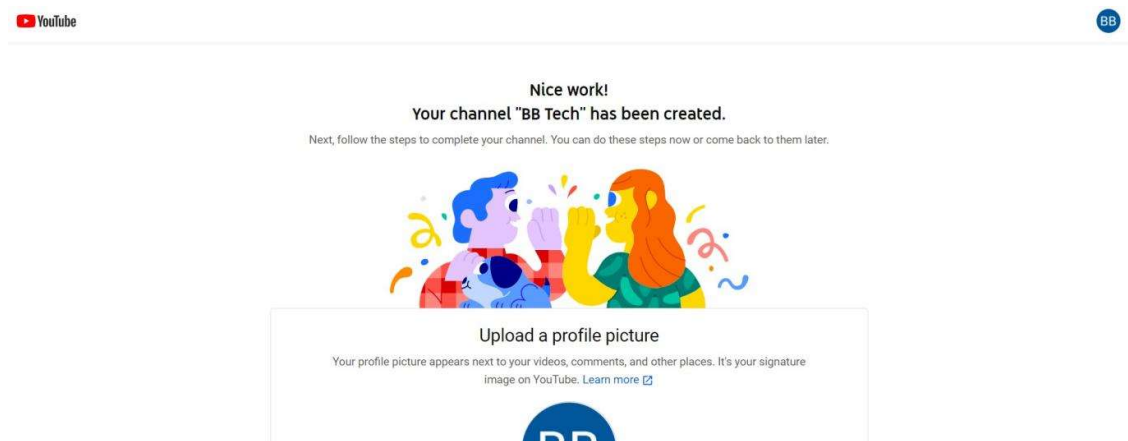
● After clicking on Create a channel button, this page will be displayed.



- After clicking on “Get Started” button, you’ll get two options for your channel name. From where you can any option



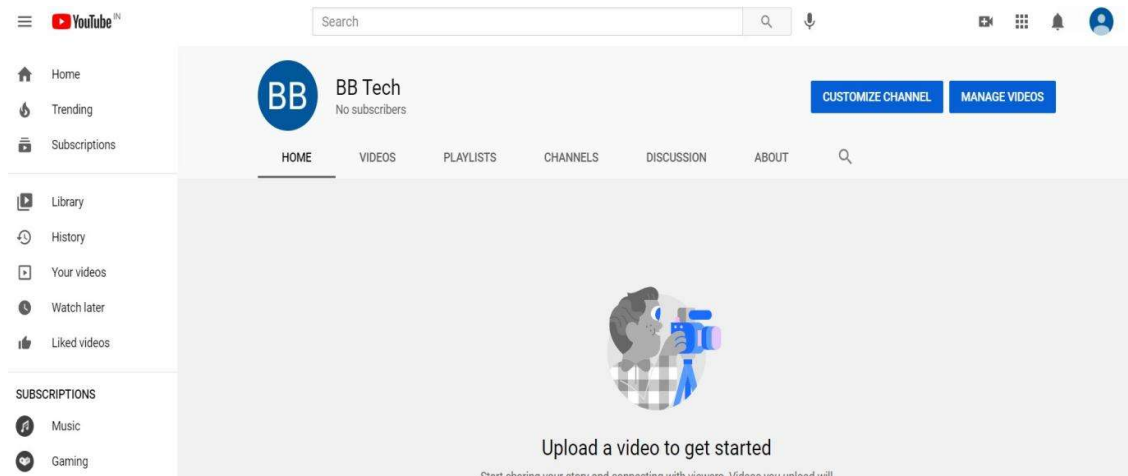
- After choosing the option of “Use your name”, this page will be displayed.



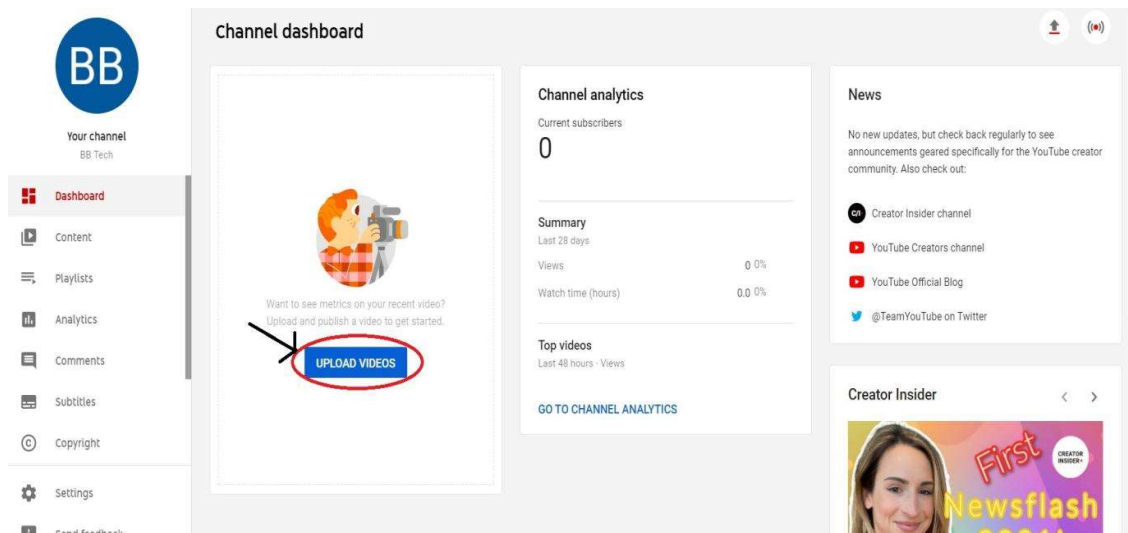
- And that’s it. Your channel has been created as “BB Tech”.

Upload A Video-

Now it’s time to upload quality video on your YouTube channel.



Click on the “upload videos” button to get started.



Choosing A Video Title-

Video title is an essential part of every YouTuber before uploading their video. In today’s era, having a good content and uploading quality videos alone does not give an audience. You really need to focus on the video SEO parts like title, tags, thumbnails and description of the video before uploading it to pull the audience.

A video title is piece of short and sweet information about your video. So, YouTube can understand what kind of video you are producing and who’s your target audience. The title is the part that your audience sees before the video. Here the viewers decides whether to play the video or not. The best title can make the video best.

Video Thumbnail-

Video thumbnail is basically the cover photo that represents your video on YouTube. It is called thumbnail because a small version of this graphic will show up in the recommended

videos and other search areas of YouTube. Because thumbnail is the part of the video that the viewer sees first, it is important for thumbnail to be attractive. If the thumbnail is attractive then the viewer will definitely click on it.

Video Channel Description Box-

Descriptions can convey valuable information to the user which helps viewers to find your videos in search results and understand what they'll be watching and its purpose. Most of the brands, vloggers, or other less-formally produced channel skip the description box as unnecessary. But the truth is that description box is crucial player in your YouTube marketing strategy. As description box contents (along with your titles, tags, and captions) help YouTube to determine if and where your videos rank on search or as related videos.

A well-written content with the right keywords can boost views and watch time because they help your video to appear in search results. Your description should be written before the video is made public. Before uploading the description, you should know that 5 lines of description are essential. The first two lines are displayed next to your video in search and when posted on social media.

How to write an attentive. Eye catching YouTube Channel Description?

- Include the keywords. A keyword is the main phrase you try to rank a video.
- Tell the viewers what your channel is, describe the main benefits.
- Include hashtags, it makes easier for other viewers to seek out related videos.
- Use simple words or natural language to describe your channel.
- Ends with strong CTA (Call to action), ask the user for subscribe, or turn on notification.

Deleting A Video-

YouTube clearly says, there is no way to undo this permanent action. Not only you will lose all of the comments and engagement from that video, but the most crucially, you will lose all of the views and Watch Time from that video. Deleting a video through YouTube website

Step 1 Sign in to your YouTube site, if you want to delete a video.

Step 2 Click on YouTube Studio button located towards the top-right corner of your screen, and then click on Videos.

Step 3 Check the boxes beside the videos which you want to delete.

Step 4 Click the action drop-down select delete.

Deleting a video through YouTube application

Step 1 Open the app and select located towards the top-right corner of your screen, and then click on Videos.

Step 2 Select the *My Video* from the pop-up options.

Step 3 On right side of each video, there will be a menu icon looks like three dots, tap on menu icon video which you want to delete. Now, tap on *Delete* option from the menu.

Marketing Skills-

YouTube is quickly becoming a key means for people to satisfy their information and entertainment needs, businesses that fail to include it in their online marketing strategy. Some tricks to promote your videos:

- **Complete your channel profile:** Make sure you have completed your YouTube channel profile. Write an attractive channel description and add a way for viewers to contact you so they can learn more about your business and contact you.
- **Thumbnails:** Many of us is not using while creating video, but thumbnails can have a big impact. Videos with a catchy title and appealing thumbnail usually rank higher. To get CTR (click to rate) you should use some highlighted areas, arrows, large text, and unexpected or unusual images.
- **Promote Your video on social media and other platform:** The more you will active on different social media platforms, the more audience you'll capture. Social media is another way to promote your channel, you can share your videos link on Facebook, on twitter, LinkedIn and many more platform. You can also post your full video on your blogs.
- **Connect with your audience:** It's not only important that YouTube is a social media channel, and therefore demands social interaction. Just not dump some videos on YouTube, blast them on social media and walk away from them expecting they will automatically generate more business for you. Your work is not ended by posting a video, without encouraging comments and discussion, you're missing a trick. Help your viewers, read the comments to improve your videos and show them that you value their opinion.
- **Upload videos based on keywords playlist:** It's important to select your keyword before you build your video content. It helps you to construct the best information around that specific topic and remember to include your keyword naturally throughout the content. This is best way to rank in search engine.
- **Brand your channel:** The branding of your channel is important since it represents your business and provides a great opportunity to add some identity to your channel. It focus on your content.
- **Constantly uploading:** You need to increase your posting frequency to at least one video in a week. Today's smartphones offer excellent video recording ability, and tools

such as Animoto make editing videos easy for anyone, so you don't need a design firm. It engaged followers and subsequently. advocators of your brand!

SEO For Video-

YouTube is one of the top search engines in the world, which is one of the reasons why it's such an attractive promotional tool for businesses. If you take the time to optimize the video and content of it on regular basis, you can reach to your targeted audience. Some factors to ranking your video on YouTube are:

- Title of your video: By giving title to your video be specific and use relevant keywords that allow your YouTube viewers to identify your video for relevant searches. You can use 100 characters, and you can change your title if you it's not performing well.
- Keywords: Use relevant keywords, that describe your channel.
- Tags: You need to add tags according to Google research tags.
- Audience watch time: Your total video watch time also counts towards your ranking.
- Likes/Dislikes: This is a important factor for your videos, if your videos get more likes it lead to a better ranking.
- Comments: If your video inspiring a lot of comments, it may be good.
- Subscribers: The more subscribers you have on your channel, the higher YouTube will rank your individual videos. To attract subscribers, produce good quality of videos and ask viewers to subscribe.

10.8 POINTS TO REMEMBER

- YouTube is a video-sharing platform which was started on February 14, 2005, by Steve Chen, Chad Hurley, and Jawed Karim. Its Headquarter in San Bruno, California.
- YouTube is the second largest search engine. It is a platform where user can upload a video, make playlist, likes, comments and manage their account.
- YouTube plays important role to promote your business and attract the user world-wide. You can create different types of channels.
- YouTube Marketing is an essential strategy to take advantage of the web's massive shift toward video.
- YouTube marketing skills is a key mean for user. You should follow all skills to promote your YouTube channel.
- If you take the time to optimize the video and content of it on regular basis, you can reach to your targeted audience.

- You really need to focus on the video SEO parts like title, tags, thumbnails and description of the video before uploading it to pull the audience.

10.9 GLOSSARY

- **SEO:** Search Engine Optimization.
- **CTR:** Click to Rate
- **CTA:** Call to Action

10.10 CHECK YOUR PROGRESS

Descriptive type questions-

- List the benefits of YouTube channel in terms of promoting your products/services.
- What types of marketing skills help you to promote YouTube channel?
- Define in short, the various types of YouTube channels.
- How SEO is useful for YouTube?
- How can you create YouTube channel? Write the steps.

Objective type questions-

- The title of the videos can be change. (True/False)
- YouTube is the fourth largest search engine. (True/False)
- CTR stands for Control to Rate. (True/False)
- YouTube is less popularly used for business world. (True/False)
- One cannot create and manage his/her YouTube channel without paying. (True/False)

Answer (Objective Type Question)-

[a] True [b] False [c] False [d] False [e] False

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10.12 SUGGESTED READINGS

VIDEO CHANNEL MANAGEMENT (YOUTUBE)- TOOLS AND ACTIVITIES- II

10.1 INTRODUCTION

10.2 OBJECTIVES

10.3 VERIFYING YOUR YOUTUBE CHANNEL

10.4 PROMOTING A VIDEO

10.5 LICENSE OF YOUR CHANNEL

10.6 CREATE PLAYLISTS

10.7 TRANSCRIPTIONS

10.8 META TAGS

10.9 YOUTUBE LIVE STREAMING

10.10 YOUTUBE IN BUSINESS

10.11 ADVERTISING ON YOUTUBE CHANNEL

10.12 YOUTUBE PREMIUM

10.13 POINTS TO REMEMBER

10.14 GLOSSARY

10.15 CHECK YOUR PROGRESS

10.16 BIBLIOGRAPHY/ REFERENCES

10.17 SUGGESTED READINGS

10.1 INTRODUCTION

As we earlier discussed, YouTube is a video sharing service where users can watch, like, share, comment and upload their own videos. The video services can be accessed on PCs, laptops, tablets and using mobile phones where Internet connection is mandatory. YouTube is the second most-visited website after Google Search, according to Alexa Internet rankings.

YouTube allows users to upload, view, rate, share, add to playlists, report, comment on videos, and subscribe to other users. Contents available on YouTube includes- video clips, TV show clips, music videos, short and documentary films, audio recordings, movie trailers, live streams, video blogging, short original videos, and educational videos.

Most content which is available on YouTube is generated and uploaded by individuals, but some media corporations including CBS, the BBC, Vevo, etc also offer some of their material via YouTube as part of the YouTube partnership program. Registered users can upload the videos on the YouTube while unregistered users can only watch the videos.

YouTube and selected creators earn advertising revenue from Google AdSense, a program that targets ads according to site content and audience. The vast majority of videos are free to view, but there are exceptions, including subscription-based premium channels, film rentals, as well as YouTube Music and YouTube Premium, subscription services respectively offering premium and ad-free music streaming, and ad-free access to all content, including exclusive content commissioned from notable personalities.

YouTube is a great place for discovering new things where one can freely watch videos, comedy shows, how to guides, recipes, listen music and many more. With several advantages and facilities there are some severe risks of using unsupervised/unguided YouTube, such as- watching/viewing inappropriate Content, Cyber bullying, etc. Cyberbullying or cyberharassment is a form of bullying or harassment using electronic means. Cyberbullying and cyberharassment are also known as online bullying.

Some of the key functions performed by users on YouTube are-

- Users can search for and watch videos.
- Create a personal YouTube channel.
- Upload videos to your channel.
- Like/Comment/share other YouTube videos.
- Users can subscribe/follow other YouTube channels and users.
- Create playlists to organize videos and group videos together.

10.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Understand the YouTube Video Channel management.
- Know about advanced tools on YouTube.
- Identify best practices of using YouTube in Business.

10.3 VERIFYING YOUR YOUTUBE CHANNEL

One of the ways to gain instant credibility is to get a verification badge for your account. That little tick mark next to your name gives your channel a sense of legitimacy. It proofs your

channel has survived the early teething stages, fought its way through the content jungle, and earned official recognition from YouTube.

A verification badge versus a verified account-

Getting a verification badge and verifying your YouTube account are two very different things. When you first create a YouTube account, you are asked to add a phone number to get your account verified. This lets YouTube know you are a real person and not a spammer/bot.

Getting a verification badge is a little different. You know that little gray tick that sometimes appears next to a channel's name, that is your YouTube verification mark. When we talk about verification for the rest of this post, that is what we will be referring to. It is a mark of authenticity. It tells to visitors that, it is a real account associated with your brand. If someone ever change the name of the channel, he/she will lose his/her verification.

10.4 PROMOTING A VIDEO

In this digital era, we are surrounded by several hand-held, multi-media devices that can connect to the Internet and stream high volume content where one can listen music, take pictures, shoot videos, and view all kinds of content on their devices. Video Marketing is one of the most effective ways to reach out to the customers because video is so engaging and now affordable. Some of the things to popularize/promote your videos are-

- Optimize Your Content.
- Craft Effective Thumbnails.
- Do not forget about Search Engine Optimization (SEO).
- Use social media.
- Integrate it with other marketing platforms.
- Do not forget to share.

10.5 LICENCE OF YOUR CHANNEL

If you mean to ask how to you start earning by uploading videos on YouTube then you need to follow these 3 simple steps.

1. Enable monetization in your YouTube account and join the YouTube partner program. This will make sure that you earn money to play ads before your videos.
2. Second you need to have an AdSense account where you get paid for playing those ads.
3. After you have enabled monetization and set up an AdSense account you can turn on ads for eligible videos. Make sure that your videos are eligible for playing the ads before them.

If you follow these steps along with all the onscreen steps while setting up your account you are good to go.

10.6 CREATE PLAYLISTS

Playlists are an easy step when you are learning how to make a YouTube channel. Here are some basic instructions to create a YouTube playlist.

How to make a YouTube playlist?

Step 1- Find the video you want in your playlist.

Step 2- Under the video, click the “Add to” button. (The three lines and a plus symbol.)

Step 3- From the dropdown menu, choose, “+ Create new playlist.”

Step 4- Enter the playlist name

Step 5- Choose the channel privacy settings: public, unlisted, or private.

Step 6- Click “Create.”

What is a YouTube playlist?

A playlist is a group of videos created by you or someone else on your YouTube channel. Whether you are a YouTube viewer or creator, it is a way to organize videos with similar characteristics as per your choice.

For example, as an actor, I have a playlist of pop-up songs. I love to listen to when I need high energy before a performance. In the same way, I could create a playlist of YouTube videos. When I want to use YouTube for research and inspiration, I could create a playlist of actor interviews or auditions.

When you are building your YouTube strategy and exploring the channel, you will see that playlists donot just apply to viewers; they are essential for YouTube creators too. Without playlists, your channel looks blank, and you aren't giving your uploaded YouTube videos the maximum potential exposure.

The benefits of YouTube playlist for its creators-

[a] Increased exposure in YouTube search results.

[b] Showing YouTube viewers your channel’s in-depth content/ value.

[c] Helping users to navigate and find YouTube videos.

[d] A source of content for YouTubers short on time.

10.7 TRANSCRIPTION

Many of us may not know, that YouTube comes with many useful features like translation for titles and description, YouTube keyboard shortcuts, etc. Similarly, there are ways with which you can transcribe YouTube videos. As nowadays, the speech recognition software have improved, where one can get a reliable automatic transcription that can be easily edited to perfection with little or no efforts. It is quite easy to transcribe YouTube videos as YouTube automatically transcribes most of the videos as soon as they are uploaded.

How to transcribe YouTube videos?

There are two ways to do the same- (i) Copy/Paste YouTube transcript (ii) Transcribe with Google Docs.

[i] Copy/Paste YouTube transcript-

Most of the YouTube videos are automatically transcribed using Google's speech recognition technology. There is also a chance that the owner of the video may have personally transcribed the video and made it available for the readers. Here are steps to do the same-

Step 1- Click on the **More** button below the video and select **Transcript** from the menu.

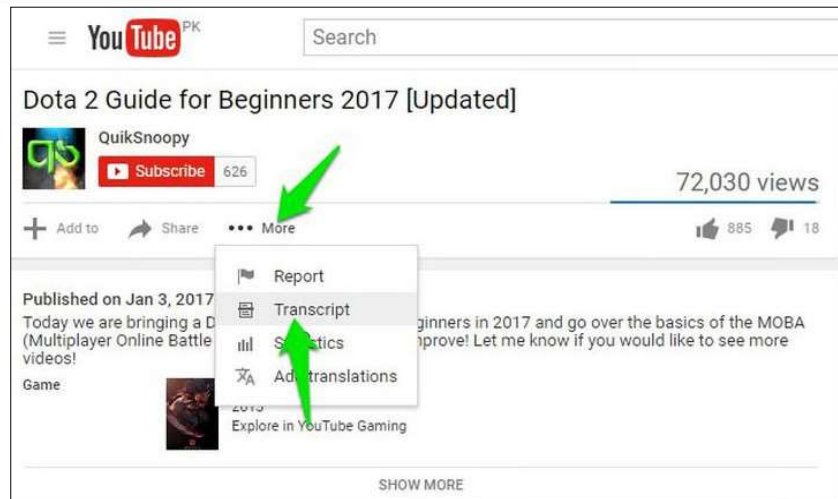


Figure 10.1 YouTube Transcript

Below you will be asked to select a language. Make your choice and you will see a “full transcript along with timestamps”.

Now “click and drag to highlight all the text” and press Ctrl + C to copy the text. You can paste this text anywhere and your transcript will be ready.

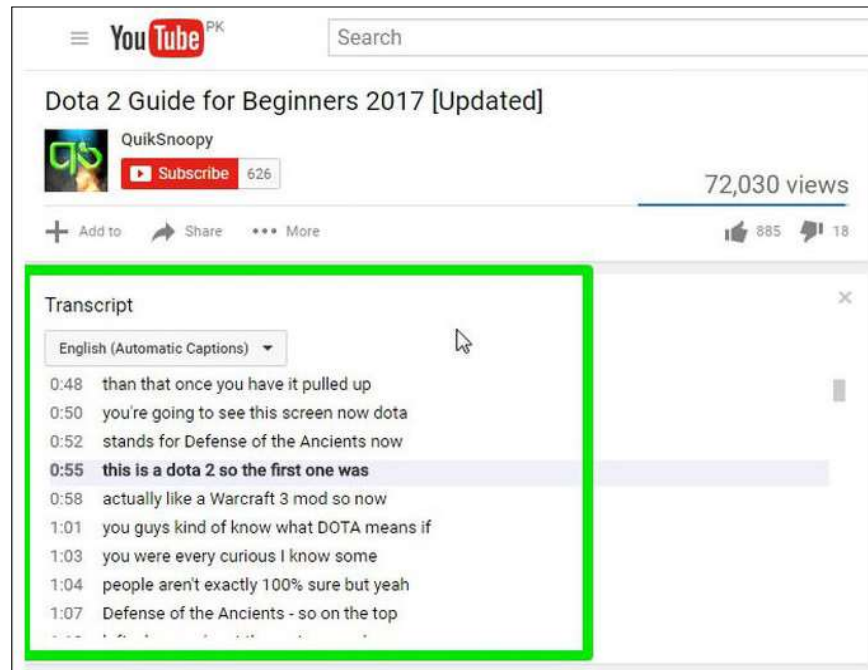


Figure 10.2 Transcript -2

YouTube automatically highlights words that it might have picked wrong which makes it easy to edit the transcript. Just click on the CC button in the YouTube player to enable subtitles and you will see the subtitles in white.

However, the subtitles with gray colour are the ones that might have some mistakes. You can see this to easily amend the transcription. Although do keep in mind that subtitles uploaded by the video owner will not have gray words.

[ii] Transcribe with Google Docs

If you want to transcribe a video without an available transcript, then you can use the GoogleDocs built-in voice typing feature to listen to the video audio and automatically type everything. In order to have a good quality transcript, it is recommended to make the PC directly **listen to the audio coming out of its speakers**. Here is how to do it-

Step 1- In Windows, right-click on the sound icon in the taskbar and select **Recording devices**.

Step 2- Now select "**Stereo Mix**" from the list and click "**Set Default**" to set it as default source of recording.

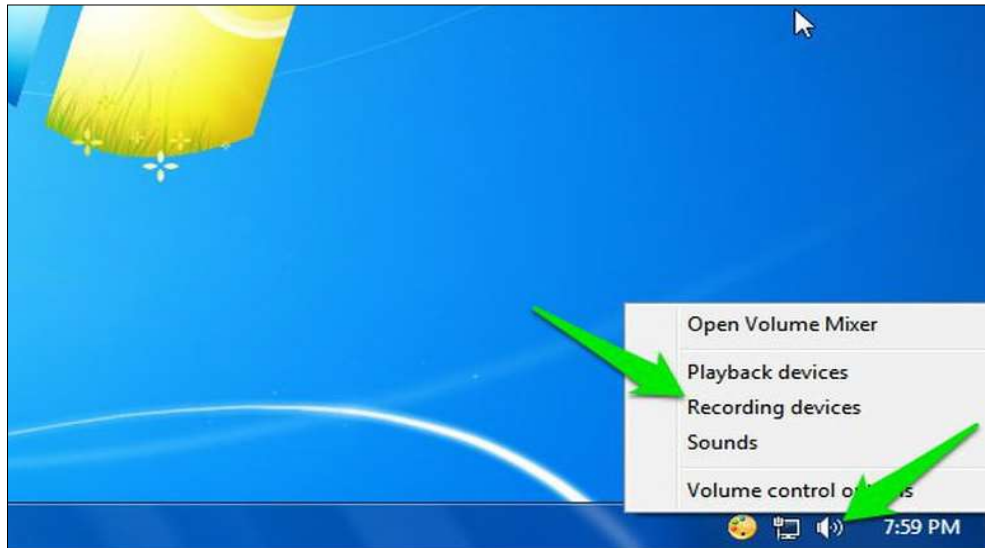


Figure 10.3 Recording setting

In case Stereo Mix option is not supported by your PC's sound card, then you can download and install the VB Virtual Audio Cable tool and get an alternative option in the same menu. After installing the drivers of the tool, you should see a "Cable Output" option in the same sound options. Select this option and then click "Set Default".



Figure 10.4 Recording setting-2

After this, your PC will listen to the audio coming out of the speakers for recording purposes. Now you just need to start Google Docs Voice typing and the required video simultaneously to start the transcription.

Step 3-Open Google Docs in Chrome or any other browser (Voice Typing isn't supported in non-Chromium browsers).

Step 4-Now create a new document and select "**Voice typing**" from the **Tools** menu on top.

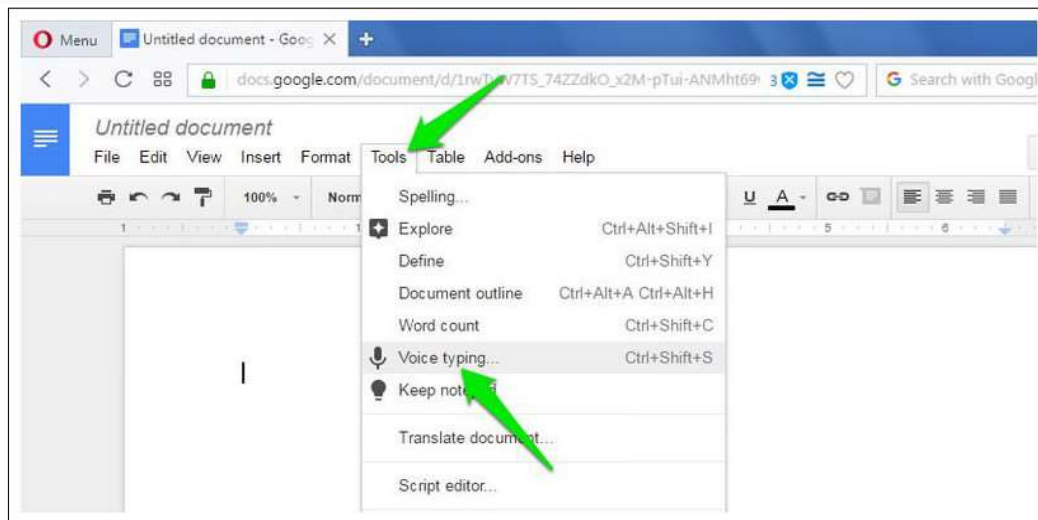


Figure 10.5 Voice Typing

Step 5- A tiny box will show up with a microphone icon in the middle. **Click on it to start recording.**

Step 6- Move to the YouTube video tab and **play the video**. Google Docs will automatically type when people will speak in the YouTube video.

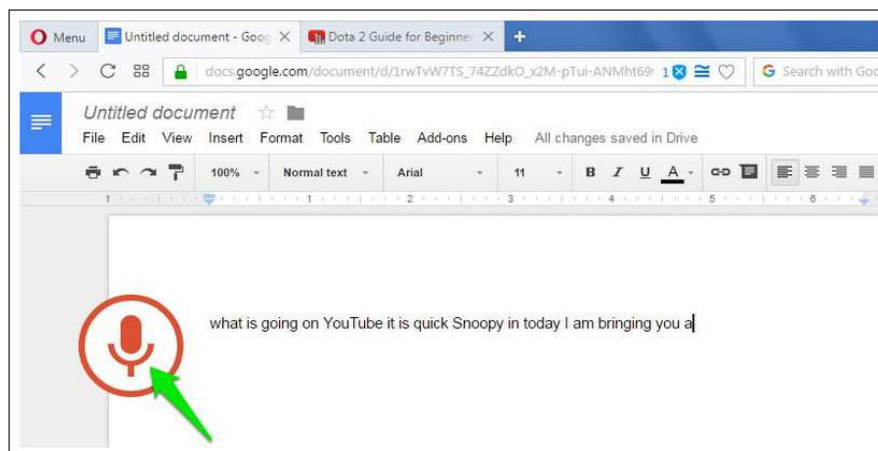


Figure 10.6 Voice Typing-2

Of course, **this process will take as much time as the duration of the video**, but at the end you'll have a good transcript of the video. Google Docs Voice typing also has **support for over 40 languages**, you can click on the Voice typing box menu to change the language. The resulted transcript should be as good as YouTube's own automatic captioning service as both use the same Speech Recognition technology.

10.8 META TAGS

YouTube tags are words and phrases that describe your video and provide more context to help people to find your content.

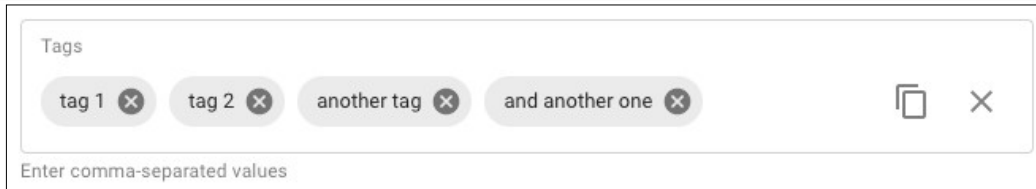


Figure 10.7 Meta Tags

Why are YouTube tags important?

Your video's title, thumbnail and description are more important pieces of metadata for your video's discovery. These main pieces of information help viewers to decide which video they should watch.

“Tags can be useful if the content of your video is commonly misspelled. Otherwise, tags play a minimal role in your video's discovery.”

How we add tags to our YouTube videos?

The process of adding YouTube tags to the videos is quite simple. We can add tags to each video no longer than 5 to 10 minutes. The steps are-

- Step 1- Set your primary target keyword as the first tag.
- Step 2- Add common, relevant keywords from top-ranking videos.
- Step 3- Add relevant keywords with search volume.

10.9 YOUTUBE LIVE STREAMING

How to enable live streaming on YouTube?

Live streaming is disabled on new YouTube channels by default. Here are steps to enable it-

- a) First, verify your YouTube account. It is a simple process as discussed before.
- b) Enable live streaming via the channel features page, the “YouTube Studio live events page”, or the “Live Control Room”.
- c) Wait for 24 hours to activate live streaming on your account.

As long as there are not any live streaming restrictions on your channel, you can now live stream on YouTube through a web browser or streaming encoder. If you want to use a mobile device to live stream, there is an additional hurdle: your channel must have at least 1,000 subscribers. Annoying, but there are other ways of mobile live streaming out there.

Four ways to live stream on YouTube-

You can live stream on YouTube through the following-

- Web browser

- Mobile device
- Software encoder
- Hardware encoder

How to live stream on YouTube: Web browser

The easiest way to live stream on YouTube is straight from your web browser using a built-in or external USB webcam. A webcam might meet your needs if all you want to do is share your thoughts and engage with your audience in real time. It's also possible to live stream through your browser with a higher-end camera like a digital camcorder or DSLR. To do so, you'll need a USB capture card to bring the video signal into your computer. Then YouTube can recognize the camera as if it were a plug-and-play webcam.

Once you're all set with a camera, here's how to live stream on YouTube through your web browser:

1. Log into your YouTube account and click the "Create a video or post" button in the top-right corner of the screen.
2. Select "Go Live" from the drop-down menu.
3. If prompted, give YouTube and your browser any required permissions for live streaming (i.e., camera, microphone).
4. In the Live Control Room, ensure "Webcam" is selected in the navigation bar at the top.
5. Give your live stream a title, select a privacy setting (public, private, or unlisted), and choose whether you'd like to live stream now or schedule an event for later.
6. Click "More options." Select your camera and microphone from the drop-down menus if they aren't listed already.
7. Click "Advanced settings" to toggle chat, age restriction, and monetization (YouTube Partner Program members only).
8. Press "Next" and pose for a thumbnail. Mouse over the thumbnail to bring up options to take another picture or upload a custom thumbnail from your computer.
9. Hit "Go live."

That's it. Remember to press "End Stream" when you're finished. YouTube will automatically upload an on-demand version of the live stream to your channel so viewers who missed it can play it back. You can see and manage all your current, scheduled, and past live streams within the "Manage" tab in the Live Control Room.

How to live stream on YouTube: Mobile

Mobile live streaming is ideal for spur-of-the-moment audience engagements and dynamic events where freedom of movement is key.

Once you've hit the subscriber threshold, though, live streaming to YouTube on a mobile device is pretty simple:

1. Download the YouTube app from the App Store (iOS) or Google Play (Android).
2. Open the app and press on the camera icon in the top-right corner.
3. Grant all the permissions YouTube needs for live streaming (camera, microphone, photos, storage).
4. Select “Go live.”
5. Choose to record with your phone’s camera (camera icon) or what’s on your display (phone icon).
6. Set a title for your stream.
7. Press “More options” to add a description, toggle live chat and monetization (if eligible), set an age restriction, configure privacy settings, and (optionally) schedule a time for your live stream.
8. Press “Next” and take a picture for your live stream thumbnail or upload an existing one from your phone’s storage.
9. Hit “Go live.”

Now you’re ready for some untethered live streaming. When you’re done, hit “Finish” and then “OK” to end the stream. A VOD version of your live stream will appear on your channel after. You can access and manage that recording and others through the “My videos” page within the “Library” tab.

10.10 YOUTUBE IN BUSINESS

- YouTube is home to more than 2 billion users worldwide and drives more than 30 million daily visits, making it a great platform for small businesses looking to market with video content.
- Video is extremely engaging and useful for many types of businesses. Creating a YouTube channel for your business offers a centralized platform for your audience to view and engage with your videos.
- Completely fill out your YouTube profile and follow these tips to upload engaging video content that will resonate with your audience and grow your followership.

Since its launch in 2005, YouTube has become a modern media powerhouse. Currently, YouTube has more than 2 billion users worldwide and 30 million daily visitors. Nearly 500 hours of video are uploaded to the site every minute, with more than 2,400 channels that exceed 1 million subscribers. The platform was purchased by Google in 2016 and currently ranks No. 2 for global and domestic web traffic, according to Alexa.

Marketing is moving toward video over static content, and YouTube is a key player. For an individual user, the site appears straightforward, but it's more complicated if you want to use it to market and grow your business. Here's what you should know to use YouTube for business.

How to set up a YouTube channel

These guides break down the process by which you can set up a YouTube channel for your small business. Each examines an important element of creating and optimizing your YouTube channel.

1. Signing up for a business YouTube account
2. Customizing your YouTube profile
3. Interacting with others on YouTube
4. Verifying your channel
5. YouTube Live
6. Trending videos on YouTube
7. YouTubers and influencers
8. Advertising on YouTube
9. YouTube Partner Program
10. YouTube Premium
11. YouTube tips and tricks

Signing up for a business YouTube account

Most social media networks require you to set up an account before you can view content. That's not the case with YouTube; you can view content without a YouTube account. However, an account is required for your company to upload videos and engage with other users. Membership is also required to view videos flagged as adult content.

Follow these steps to create your business YouTube account:

1. **Sign in to your company's Google account.** If you use Gmail for your business email, you'll use the same username and password for your YouTube account that you use for Gmail. Alternatively, you can create a new Google account that you use solely for YouTube business purposes.
2. **Once signed in, visit YouTube's homepage.** Double-check that you're signed in to the appropriate business account instead of your personal YouTube account.
3. **Click on your Google account's avatar.** You'll find this in the top right corner. It's a small circle containing your picture (or your company's logo if you've set that as your email address's picture).
4. **Click on "Your channel."** This option will appear in the dropdown menu that displays when you click your avatar. It's the top option in the first batch of icons.
5. **Choose "use a business or other name."** You'll need to select this option to get started with a business YouTube account. You can then enter your company's name.
6. **Click "Create."** Then, voila! You have a business YouTube account.

Once you've taken these steps, return to the YouTube homepage. In the top left corner of the page, there is a dropdown menu with quite a few options. There are links for the homepage,

trending videos, your library and your subscriptions. Your library lets you organize which videos you've watched, liked and saved for later. Under your subscriptions, you can see all the channels you're subscribed to and receive notifications when they've uploaded new content.

In the top right corner of the page, there are four buttons. The one closest to the center, which is an icon of a video camera, directs you to the page where you upload a video. The middle icon, a square comprising nine smaller squares, is for YouTube apps. The next one, the bubble icon, will take you to messages. The next button is an icon of a bell, and it notifies you of your account activity, such as a new like or comment. The one closest to the right side, which is an icon of your profile picture, will direct you to your account information pulled from Google.

Interacting with others on YouTube

There are several ways to interact with other YouTube users.

- **Comments:** Comments can be organized by most popular or newest. You can boost your video's engagement traffic by responding to users who comment on your videos.
- **Likes:** This is a more passive form of interacting with content. However, if you've chosen to show your likes publicly on your channel, these videos will appear under the playlists section on your channel.
- **Subscriptions:** The best way for users to stay up to date with your brand's content is to subscribe. Every time you upload a new video, your subscribers receive a push notification. You should constantly encourage viewers to subscribe to your channel, as it improves your engagement traffic and increases the number of views. Many popular YouTubers incorporate reminders to subscribe at the beginning and/or end of their videos.
- **Playlists:** You can organize related content together using the site's playlist feature. If you choose to publicize your playlists, they will appear on your channel's page below your uploaded content. You can also organize other users' content with a playlist. For instance, if you run a marketing agency, you could compile a client's videos into one big list. Otherwise, this is another way to organize your own content on your channel.
- **Sharing:** The site's social widget allows users to share videos on other social media networks, such as Twitter, Facebook, Google Plus, Blogger, Reddit, Tumblr, Pinterest and LinkedIn.
- **Messages:** You can also share private videos and messages with friends and contacts on YouTube.

10.11 ADVERTISING ON YOUTUBE CHANNEL

YouTube advertising, done through Google Ads, is a way of advertising your video content on YouTube or in search results so you can maximize your user reach. This could be your

video playing before a user view another's video or showing up in YouTube search results for people to watch in full.

Types of YouTube Ads- There are six types of YouTube ads:

- 1) TrueView ads
- 2) Non-skippable instream ads
- 3) Bumper instream ads
- 4) Sponsored card ads
- 5) Overlay ads
- 6) Display ads

What is a YouTube TrueView Ad?

This is the main advertising format on YouTube — and for that reason, we'll be covering this type in more depth than the others.

TrueView ads give viewers the most control over the advertisements they see. Because of this, Google reports that eight out of ten viewers prefer TrueView to other in-stream video ad formats.

But TrueView ads are great for businesses too.

Advertisers only pay for TrueView ads when users watch for at least 30 seconds, watch an entire short video, or interact with an ad in some way, such as clicking on a call-to-action.

And because viewers can select the ads they want to watch and skip the ads they don't, advertisers save money while also reaching a more interested audience.

YouTube states that the maximum length a TrueView video ad can be is 6 minutes and the minimum is 12 seconds.

Now, there are two main types of TrueView ads: in-stream ads and discovery ads. Let's take a closer look at each of them.

TrueView Instream Ads

TrueView in-stream ads play before a viewer's chosen video.



The image below features a TrueView in-stream ad from unbounce

Figure 10.8 YouTube Bounce Option

In-stream ads also feature a small countdown timer and a link to the advertised site in the bottom left of the screen. What's more, TrueView in-stream ads have a companion banner ad that's displayed in the right-hand sidebar above the suggested videos list. The image below shows the companion ad for the Unbounce advertisement above:

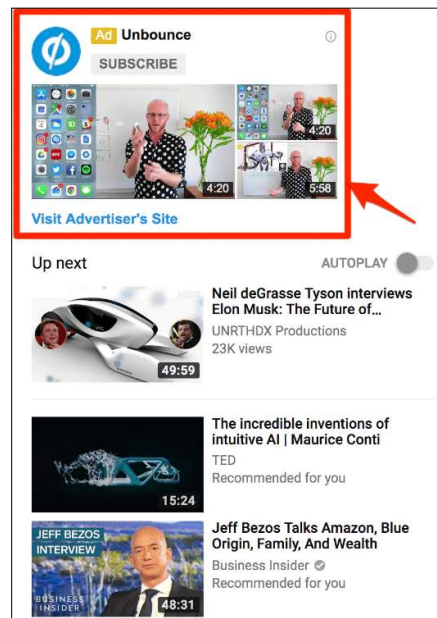


Figure 10.9 YouTube Bounce Option

Marketers are able to customize TrueView in-stream ads with calls-to-action and text overlays.

How to Advertise on YouTube

Depending on your expectations how you advertise on YouTube will differ. YouTube advertising can be used to build brand awareness, influence the buying decision, grow sales, or increase brand loyalty. Video advertisements on YouTube can be used to drive these objectives in the following ways:

- **Build Brand Awareness**
Introduce your product to people who do not know much, or anything, about it yet. Target people who are interested in similar products and areas to you so you know there are commonalities.
- **Influence the Buyer Decision**
Videos that justify why your product is the best option for your customer, including hard evidence to back it up, convert the best so capitalize on it.
- **Grow Sales**
Branch out to lookalike audiences that you have never targeted before and test new tactics. Research ways to link your product to others and start growing sales.
- **Increase Brand Loyalty**
Invite your customers to talk about your product in your videos and show prospects that you provide the best products and services in the business.

What are the Benefits of YouTube Advertising?

The cost of YouTube advertising can be off-putting for small companies, especially if your core business is drop shipping. This could be because you do not have much capital to invest, or maybe you are not seeing the ad revenue you expected from other advertising platforms, like social media advertising.

But YouTube advertising focuses on a different content format, with a very different way of engaging with people. If your audience engages with video content better than others then YouTube advertising is the best platform to discover ad revenue from.

Reach

As YouTube has over 1 billion users on the platform, and over 1 billion unique visits each month, YouTube advertising has the potential to reach a large percentage of the population when they are highly engaged.

Targeting

YouTube, as part of the Google empire, has a wealth of knowledge that only Facebook can rival. This knowledge of individual preferences and interests can help you target the right people with your YouTube advertising. Be careful not to over optimize your targeting and limit your reach.

Data

The reports you receive during your advertising campaigns are in-depth and provide information about not just your ads but also those who interacted with them. Get to know the audience who interacted with your content. What content did they enjoy before they went on

to buy something from your store? Linking your Google Ads and Analytics accounts together to get more information.

Users

After a person has visited your website and shown interest in your business, don't wait for them to come back again – build a relationship with them. As part of the Google suite, remarketing can help you target people with ads if they have visited your website, meaning that you can lead them back to your website, build trust with them, and, hopefully, make a sale in the future.

Flexibility

YouTube advertising is not static; it is constantly changing, and so can your ads. You can change your targeting, ad schedule, ad copy, etc, in real time to ensure you get the most out of your advertising budget with YouTube. Tailor your ads over time to evolve as your audience does.

10.12 YOUTUBE PREMIUM

Google announced YouTube Music, YouTube Music Premium and YouTube Premium on Thursday — a dramatic change to its current music and video offerings.

Here's basically what's happening: It's getting rid of YouTube Red and splitting that into new services. YouTube Red, if you're unfamiliar, was a \$11.99 monthly plan that offered an ad-free YouTube experience that included music. Customers who currently pay for YouTube Red will get the new YouTube Premium service at the same price they currently pay.

The new plan still sounds confusing, so I'm going to break down what Google's doing here.

YouTube Premium is Google's new paid all-encompassing ad-free service. (The free version of YouTube, with ads, will live on.)

YouTube Premium costs \$11.99 a month and includes ad-free video, the option to continue playing videos or music "in the background" (meaning the audio will continue if you minimize the app), music and video downloads, and access to YouTube original movies and TV shows. It also includes YouTube Music Premium, which alone costs \$9.99 per month.

If you're looking to pay for one of these, YouTube Premium is the best bet since it offers the most bang for your buck.

YouTube Music Premium

YouTube Music Premium is included in YouTube Premium but can also be purchased as a stand-alone product for \$9.99 a month.

It includes music playlists, music videos, remixes and live versions of songs. Subscribers to Google's Spotify competitor, Google Play Music, get this as part of that subscription. Google

Play Music costs \$9.99 a month, so your best bet is to just subscribe to that and then you get YouTube Music Premium included.

Again, unless you're focused purely on music, you might as well pay the extra \$2 a month to get YouTube Premium.

How does this compare to its rivals?

Google is trying to make a move against Spotify and Apple Music. Those services are still compelling on their own, however. Both offer family plans for \$15 a month, which YouTube Premium doesn't have. Apple Music and Spotify have music videos and live concerts, just like YouTube Music Premium. Also, Spotify recently tried to stand out by partnering to offer Hulu with limited commercials for \$12.99 a month.

Taking customers away from their existing streaming music service is tough. Consumers have established playlists and music libraries, for example, which means they need to start fresh when they begin a new service. Since Spotify has been around for so long, it already has an established user base of 157 million monthly users and 71 million paying subscribers. To attract newcomers, Spotify also recently introduced a more compelling free service.

10.13 POINTS TO REMEMBER

- YouTube is a video sharing service where users can watch, like, share, comment and upload their own videos. The video service can be accessed on PCs, laptops, tablets and via mobile phones.
- YouTube allows users to upload, view, rate, share, add to playlists, report, comment on videos, and subscribe to other users.
- Video Marketing is one of the most effective ways to reach out to customers because video is so engaging and now affordable.
- A playlist is a group of videos created by you or someone else on YouTube. Whether you are a YouTube viewer or creator, it's a way to organize videos with similar characteristics.
- The cost of YouTube advertising can be off-putting for small companies, especially if your core business is drop shipping. This could be because you do not have much capital to invest, or maybe you are not seeing the ad revenue you expected from other advertising platforms, like social media advertising.
- Comments can be organized by most popular or newest. You can boost your video's engagement traffic by responding to users who comment on your videos.
- This is a more passive form of interacting with content. However, if you've chosen to show your likes publicly on your channel, these videos will appear under the playlists section on your channel.

- The best way for users to stay up to date with your brand's content is to subscribe. Every time you upload a new video, your subscribers receive a push notification. You should constantly encourage viewers to subscribe to your channel, as it improves your engagement traffic and increases the number of views. Many popular YouTubers incorporate reminders to subscribe at the beginning and/or end of their videos.
- YouTube tags are words and phrases that describe your video and provide more context to help people find your content.
- YouTube advertising, done through Google Ads, is a way of advertising your video content on YouTube or in search results so you can maximize your user reach.
- YouTube Premium costs \$11.99 a month and includes ad-free video, the option to continue playing videos or music “in the background” (meaning the audio will continue if you minimize the app), music and video downloads, and access to YouTube original movies and TV shows.

10.14 GLOSSARY

- SEO- Search Engine Optimization.
- URL- Uniform Resource Locator.
- GDPR- General Data Protection Regulation.
- UVC- USB Video Class.
- HDMI-High-Definition Multimedia Interface.

10.15 CHECK YOUR PROGRESS

Descriptive type questions-

- a) What are the main functions of YouTube?
- b) How to set up a YouTube channel. Explain in details.
- c) Explain the tips for keeping your child safe on YouTube.
- d) What are YouTube tags? Why are YouTube tags important?
- e) What is a YouTube playlist? Discuss the benefits of YouTube playlists for creators.
- f) How to enable live streaming on YouTube?
- g) Why do a competition analysis on YouTube? How to find your competitors on YouTube.

Objective type questions-

- a) YouTube automatically highlights words that it might have picked wrong which makes it easy to edit the transcript. (True/False)
- b) A playlist is a group of audios created by you or someone else on YouTube. (True/False)

- c) Mobile live streaming is ideal for spur-of-the-moment audience engagements and dynamic events where freedom of movement is key. (True/False)
- d) YouTube is a business fail, a social media platform easy. (True/False)
- e) Display ads are another simple YouTube advertising format. These ads have been around for a while and appear in the right-hand sidebar above the suggested videos list. (True/False)
- f) can be organized by most popular or newest. You can boost your video's engagement traffic by responding to users who comment on your videos
- g) A is an appliance purpose-built for video streaming, capturing, recording – or all three.

Answer (Objective Type Question)-

- [a] True [b] False [c] True [d] False [e] True
- [f] Comment [g] hardware encoder

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10.17 SUGGESTED READINGS

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