B.Ed. Second Year	Paper- XV

ICT IN TEACHING-LEARNING PROCESS

Units: 1 to 8

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ICT IN TEACHING-LEARNING PROCESS

COURSE CODE- XV

CONTENTS

B.Ed 2nd Year

Paper XV

"ICT IN TEACHING-LEARNING PROCESS"

Marks: 50 (40 + 10)

Course objectives:

The learners will be able to:

1. Understand the concept and role of "ICT" in construction of Knowledge.

2. Acquire knowledge and understanding about National Policy on ICT in School Education.

3. Identify the challenges in integration of ICT in school education.

4. Understand computer fundamentals.

5. Employ hands-on-experience on computer.

6. Apply different Hardware Technologies in Modern Educational Practices.

7. Familiarize with the new trends in ICT.

8. Apply different e-resources for educational purposes.

UNIT I: " Introduction to ICT and Computer Fundamentals"

Concept of ICT: Meaning & Characteristics; Role of Information Technology in Construction of Knowledge.

National Policy on ICT in School Education; Challenges in Integrating ICT in School Education;

Computer Fundamentals: Meaning, Components & Types of Computer; Functions of Operating System; Application Softwares.

Computer Application in Learning: Concept, Features and Advantages of Word (Word Processor); Excel (Spread Sheets) and PowerPoint (Slide Preparation & Presentation).

UNIT II: " ICT in Teaching – Learning Process"

Hardware Technologies and their applications: Overhead Projector (OHP); Preparing Transparencies, Slide Projector, Audio-Video Recording Instruments.

Hardware Technologies and their applications: DLP Projector; Movie Projector; Close Circuit Television (CCTV).

New Trends in ICT: Concept, Elements and Advantages of Smart Classroom; EDUSAT.

Internet & Online Learning Resources (e- Library, Websites; Web 2.0 Technology and Open Educational Resources) in learning.

Suggested Readings

Barton, R. (2004). *Teaching secondary science with ICT.* McGraw-Hill International.

Bhaskara Rao, Digumarti. (2013).*Vidya - SamacharaSankethikaSastram (ICT in Education).* Guntur: master minds, Sri Nagarjuna Publishers.

Denis, Kim, Sen and Morin. (2000). *Information Technology - The Breaking Wave.* New Delhi: Tata McGraw-Hill Publishing Co. Ltd.

Imison, T. & Taylor, P.H. (2001). *Managing ICT in the Secondary Schools.* Heinemann: Oxford.

Intel. *Teach to the Future - Pre-Service Binder – Version 2.0*

Kumar, K.L. (2000). *Educational Technology*. New Delhi: New Age International Pvt. Ltd.

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Meredith, Marilyn and Rustkosky, Nita. (2000). *Advanced Microsoft Office 2000*. New Delhi: BPB Publication.

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Sutherland, R., Robertson, S. and Peter John. (2009). *Improving Classroom Learning with ICT*. New York: Routledge

UNIT-1

INTRODUCTION TO ICT

STRUCTURE

1.0   Introduction

1.1   Learning Objectives

1.2   Definition of ICT

   Self-Check Exercise-1

1.3   Characteristics of Information Technology

   Self-Check Exercise-2

1.4   Role of Information Technology in Construction of Knowledge

   Self-Check Exercise- 3

1.5 Summary

1.6 Glossary

1.7 Answers to Self- Check Exercises

1.8   References/ Suggested Readings

1.9   Terminal Questions

1.0   INTRODUCTION

Information Technology includes all the technology used to gather, process, secure, and store information. It encompasses hardware, software (computer programs), and computer

networks. This field focuses on the exchange and use of different types of information. Information and Communication Technology (ICT) serves as the foundation of the economy and plays a crucial role in driving social change in the 21st century.

Geographical distance is no longer a barrier to accessing information; for instance, activities like remote work, online education, e-banking, and e-government can now be done from any location with an internet connection and a computing device.

1.1 LEARNING OBJECTIVES

By the end of this unit, you will be able to:
• Comprehend the core concepts of Information and Communication Technology (ICT).
• Explain the significance of ICT in modern society.
• Identify the key characteristics of Information Technology.
• Evaluate the impact of Information Technology on learning and information sharing.
• Recognize examples of IT tools that facilitate knowledge construction.

1.2 DEFINITION OF ICT

The term Information Technology (IT) was first coined in the early 1980s to describe the integration of computer and communication technologies. In the 1990s, the term Information and Communication Technology (ICT) gained prominence as a replacement for IT, emphasizing the communication aspect. In Australasia, the term IT&T (Information Technology and Telecommunication) is also used instead of ICT.

For some people, ICT represents Information and Content Technology, to indicate the convergence of Information Technology and Content Technology. There are a number of definitions of ICT. The most comprehensive one is given by British Computer Society as follows:

- "Information Technology is a field of science, technology, engineering, and management focused on managing information, its applications, and its connections to social, economic, and cultural issues." – UNESCO
• The scientific, technological, and engineering fields...

- and the management techniques used in information handling, processing and disseminating; their applications; computers, networking and communication and their integration with men and machines; and associated social, economic and cultural matter. "*(British Computer Society)*

- *Ebijuwa and ToAnyakoha (2005)* "defined ICT as "tools and as well as means used for collection, capture, process, storage, transmission and dissemination of information".

- "Information technology is a systemic study of artifacts that can be used to give form to facts in order to provide meaning for decision making, and artifacts that can be used for organization, processing, communication and application of information" -*Darnton and Giacoletto*

The definition of ICT as given above is different from the definition given by some American authors. For example,

- *Turban et al* defined ICT as an organization's collection of information resources, their users, and the management that oversees them; includes the IT infrastructure and all other information systems in the organization.

- Additionally, some informal definitions of ICT found on the web   include:
  - • It also encompasses the various services and applications related to these technologies, such as videoconferencing and distance learning. ICT is often discussed in specific contexts like education, healthcare, or libraries. The term is more commonly used outside the United States (Whatis.com).
- • ICT stands for Information and Communications Technology, referring to the study or practice of developing and using technology to process information and facilitate communication (Webopedia.com).
-

Self-Check Exercise- 1

(i).   Define the term ICT as per UNESCO

(ii)   ICT stands for- ....

1.3 CHARACTERISTICS OF INFORMATION TECHNOLOGY

The characteristics of Information Technology refer to the distinct features and qualities that define how IT systems operate and their impact on various applications. These include:

Characteristic	Description
Automation	IT automates repetitive tasks, reducing the need for manual intervention and increasing efficiency.
Speed	IT systems process and transmit information rapidly, enabling quick decision-making and real-time updates.

Characteristic	Description
Storage	Offers vast storage capacities, allowing for the retention and management of large datasets.
Connectivity	Facilitates global communication and collaboration through networks, enhancing teamwork and information sharing.
Versatility	Applicable across various industries and functions, supporting a wide range of activities from data analysis to customer service.
Scalability	IT infrastructure can easily scale up or down to meet changing demands, ensuring flexibility and cost-effectiveness.
Interactivity	Provides interactive interfaces that enhance user experience and engagement through real-time feedback and customization.
Reliability	Designed for consistent performance, minimizing downtime and ensuring dependable operation.
Accuracy	Delivers precise data processing and calculations, reducing errors and enhancing decision-making quality.
Cost-effectiveness	Reduces operational costs through efficiency, automation, and optimized resource management.
Integration	Seamlessly integrates with other technologies and systems, creating unified platforms that enhance productivity.
Accessibility	Ensures access to information and resources anytime and anywhere, supporting remote work and online collaboration.
Security	Implements robust measures to protect data integrity, confidentiality, and privacy, safeguarding against threats.

These characteristics make IT a vital tool in modern business and personal contexts.

Self-Check Exercise- 2

Which of the following does NOT describe a characteristic of Information Technology?

(a) Real time access to information

(b) Easy availability of updated data

(c) Narrow range of communication media

(d) Connecting geographically dispersed regions

1.4 Role of Information Technology in Construction of Knowledge

In the last 20 years the development of new technological tools, and the increasing need for life-long learning, led to a growing attention to online education, i.e., e-learning activities. "Information and Communication Technology (ICT) in education have become more and more a field of interest both for scholars and practitioners involved in learning activities".

Globally, this phenomenon has attracted a rapidly growing amount of research facing up technology-supported learning from different theoretical perspectives. Today, there is widespread consensus on the role of ICT in enhancing learning and as a crucial tool for adapting education and training systems to the knowledge society. The rise of ICTs as a learning technology inadvertently encourages the exploration of alternative learning

theories. Traditional teaching has typically centered on teachers organizing and guiding students through structured sequences to achieve specific outcomes. This approach focuses on the planned transmission of knowledge, with some interaction with the content to reinforce the acquisition of knowledge. It relies on personal understanding, where learning is seen as the construction of meaning rather than simple memorization of facts. The use of ICTs offers numerous opportunities for resource-based, student-centered learning. It supports various aspects of knowledge construction, and as more students incorporate ICTs into their learning, the impact of this approach becomes increasingly significant.

Table Shows;

Role	Description
Access to Information	Provides vast resources and databases for research and learning.
Collaboration Tools	Facilitates communication and collaboration among learners and experts worldwide.
Data Analysis	Enables processing and analysis of large datasets to generate insights.
Interactive Learning	Offers platforms for engaging and interactive educational experiences.
Knowledge Sharing	Supports platforms for sharing information and resources, enhancing collective learning.
Personalized Learning	Adapts educational content to individual needs and learning styles.
Real-Time Feedback	Provides instant feedback, helping learners understand concepts better and faster.
Simulation and	Allows exploration of complex systems and

Role	Description
Modeling	scenarios, enhancing understanding.

This table outlines how IT contributes for process of knowledge construction.

Self-Check Exercise- 3

"Information and Communication Technology (ICT)" in education has increasingly become a topic of interest for both _____ and _____ involved in learning activities.
1.5 Summary: The rise of ICTs as a learning tool unintentionally encourages the consideration of alternative learning theories. Traditional teaching has mainly focused on teachers organizing and guiding students through a series of structured sequences to achieve desired outcomes. ICTs are often discussed within specific contexts, such as education, healthcare, or libraries. The term is more commonly used outside of the United States (Whatis.com. The scientific, technological and engineering disciplines and the management techniques used in information handling, processing and disseminating; their applications; computers, networking and communication and their integration with men and machines; and associated social, economic and cultural matter.

1.6 GLOSSARY

'Information and Communication Technology (ICT)": ICT refers to the tools for collecting, capturing, processing, storing, transmitting, and disseminating information.

Construction of knowledge: construction of knowledge is a dynamic and interactive process where learners build new understanding by actively engaging with information, drawing on prior knowledge, interacting with others, and reflecting on their learning experiences.

1.7 Answers to Self- Check Exercises

Answers to Self-Check Exercise- 1

(i) . According to **UNESCO,** "Information Technology is a scientific, technological and engineering discipline and management technique used in handling the information, *it's application and association with social, economical and cultural matters."*

(ii) Information and Communication Technology

Answers to Self-Check Exercise- 2

(c) Narrow range of communication media

Answers to Self-Check Exercise- 3

Scholars and Practitioners

1.8 REFERENCES/SUGGESTED READINGS

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1.9 TERMINAL QUESTIONS

1. Explain the definitions and characteristics of ICT.

2. Describe the role of Information Technology in construction of knowledge.

UNIT-2

"NATIONAL POLICY ON ICT IN SCHOOL EDUCATION"

STRUCTURE

2.0   Introduction

2.1   Learning Objectives

2.2   National Policy on "Information and Communication Technology (ICT)" in Education

  Self-Check Exercise- 1

2.3   Information and C . Technology in School Education: Challenges and Issues

  Self-Check Exercise-2

2.4   Summary

2.5   Glossary

2.6   Answers to Self- Check Exercises

2.7   References/ Suggested Readings

2.8   Terminal Questions

2.0   INTRODUCTION

This unit seeks to clarify the role of the National Policy on Information and Communication Technology (ICT) in school

education, along with the challenges and issues associated with integrating ICT into the education system. The incorporation of ICT in education has brought about significant transformations in teaching and learning processes. In this context, the National Policy on ICT in School Education has emerged as a crucial framework, emphasizing the importance of embracing educational technology throughout India.

2.1 LEARNING OBJECTIVES

you will be able to:
• Describe the goals and objectives of the National Policy on ICT in School Education.
• Identify the key components of the policy.
• Recognize common challenges in integrating ICT into school education.
• Suggest strategies to address the identified challenges.

2.2 National Policy on Information and Communication Technology (ICT) in School Education

1. **Preamble**
The National Policy on Education of 1986, amended in 1992, stressed the importance of educational technology in improving the quality of education. This led to the launch of two major centrally sponsored initiatives: Educational Technology (ET) and Computer Literacy and Studies in Schools (CLASS). These initiatives eventually led to the introduction of the Information and Communication Technology @ Schools initiative in 2004. Educational technology was also incorporated into another program focused on upgrading science education. The pivotal role of ICT in school education was further reinforced in the National Curriculum Framework (NCF) of 2005. The use of ICT to enhance quality is also a core element of the Government of India's flagship education program, Sarva Shiksha Abhiyan

(SSA). Additionally, ICT was included in the educational norms recommended by the Central Advisory Board of Education (CABE) in its 2005 report on Universal Secondary Education. With the convergence of various technologies, there is a growing need for a comprehensive strategy to improve school education through ICT across the country. A solid policy framework is necessary to fully utilize ICT's potential for educational development. The ICT Policy in School Education is driven by the vast potential of ICT to enhance access and quality in education. This policy aims to assist States in effectively applying ICT within the context of a national policy framework.

2. Vision, Mission, and Policy Goals

Vision
The ICT Policy in School Education aims to equip youth with the necessary skills to contribute to the development, sustainability, and growth of a knowledge-based society, fostering the nation's overall socioeconomic development and ensuring global competitiveness.

Mission
The mission is to develop, promote, support, and sustain ICT and ICT-enabled activities and processes to enhance access, quality, and efficiency within the school system.

Policy   Goals
To meet these objectives, the ICT Policy in School Education focuses on:

- **Creating:**
  • An environment fostering ICT knowledge within the community.
  • A literate community that can effectively utilize ICT and contribute   to   the   nation.

- A collaborative environment that maximizes the benefits of ICT in education.
- **Promoting:**
  - Universal, equitable, open access to cutting-edge ICT tools and resources for all students and teachers.
  - The development of localized, high-quality content, with the capacity for collaborative use of digital resources.
  - The formation of professional networks among teachers, resource persons, and schools to encourage resource sharing, professional growth, and continuous teacher education.
  - Research and experimentation with ICT tools to optimize their use in school education.
  - A comprehensive understanding of ICT, including its benefits, risks, and limitations.
- **Motivating and Enabling:**
  - Encouraging widespread participation from all societal segments to enhance the school education system through effective ICT use.

3. What is ICT?

Information and Communication Technologies (ICT) encompass a range of devices, tools, content, resources, platforms, and services—both digital and capable of being converted to digital formats—that can be used to achieve teaching and learning goals, expand access to resources, build capacities, and manage educational systems. ICT includes not only hardware connected to computers and software applications, but also interactive content, internet services, satellite communication, radio and television, web-based content repositories, learning management systems, and management information systems. ICT also covers processes involved in digitizing, deploying, and managing content, developing platforms for capacity building, and creating forums for collaboration.

4. Information and Communication Technology in School Education

4.1 Challenges and Issues

4.2 ICT Literacy and Competency Enhancement

The policy defines ICT literacy in terms of competency levels. Based on when a student or teacher is introduced to ICT, they progress through various levels, which should be adaptable to local conditions. These levels are flexible and should be periodically updated to reflect technological advancements.

4.3 ICT-enabled Teaching-Learning Processes

ICT-enabled teaching involves a variety of techniques, tools, content, and resources designed to improve education quality and efficiency, ranging from media tools to multimedia self-learning modules, simulations, and virtual learning environments. The availability of diverse resources will transform classrooms into ICT-enabled spaces.

4.4 Elective Courses at the Higher Secondary Level

States will introduce ICT-related courses at the higher secondary level, addressing the needs of both academic and vocational students.

4.5 ICT for Skill Development (Vocational and Job-Oriented Areas)

ICT-focused vocational courses will be developed in the higher secondary vocational stream to meet the needs of ICT-enabled industries, offering broad-based ICT literacy.

4.6 ICT for Children with Special Needs

ICT will support inclusive education through tools like screen readers and Braille printers. Special attention will be given to ensuring access to appropriate ICT resources for both students and teachers with special needs.

4.7 ICT for Open and Distance Learning

ICT will offer alternative education opportunities for students who have dropped out or cannot attend formal education. ICT-based instruction will strengthen formal education systems in Open and Distance Learning (ODL) settings.

**5.	ICT	for	School	Management**
**5.1	Automated	and	ICT-Managed	School	Processes**
5.2 School Management Information System (School MIS)

**6.	ICT	Infrastructure**
ICT infrastructure will be classified into:

- Core ICT Infrastructure
- Enabling Infrastructure

**6.1	Hardware**
States will provide advanced, cost-effective, and sufficient ICT infrastructure for all secondary schools.
**6.2	Network	and	Connectivity**
All school computers will be connected through local area networks to enable optimal resource sharing, with internet access available in libraries, teachers' rooms, and the headmaster's office.
**6.3	Software**
A software environment supporting active learning, participatory practices, and knowledge sharing will be emphasized, with a preference for Free and Open-Source Software (FOSS).
**6.4	Enabling	Infrastructure**
States will ensure the necessary infrastructure to maintain ICT facilities.

**7.	Digital	Resources**
**7.1	Digital	Content	and	Resources**
States will ensure equitable and open access to ICT tools and resources for all students and teachers, aligned with the National Policy on Open Standards of the Government of India.
**7.2	Development	of	Content**
The development of interactive ICT tools, such as virtual labs, will be promoted, along with the creation of digital resources like e-books, videos, animations, lessons, and games.
**7.3 Sharing	and	Dissemination	of	Digital	Content**

Digital content will be widely shared to integrate ICT into classroom practices, with open standards for interoperability and web-based sharing.

7.4 Role of School Libraries

School libraries will categorize and share digital resources, automating their systems to facilitate access for teachers and students.

8. Capacity Building

8.1 Capacity Building of In-Service Teachers

A phased capacity-building program for teachers will support the integration of ICT practices into education. This will include Induction and Refresher courses offered by relevant educational bodies.

8.2 Capacity Building through Pre-Service Teacher Education

Teacher educators will be trained to incorporate ICT into pre-service programs, ensuring future educators are well-versed in ICT use in education.

8.3 Capacity Building of School Heads

School leaders will receive training to optimize ICT use and integrate ICT-enabled practices.

8.4 Capacity Building of State/District Education Department Personnel

State and district-level personnel will receive training to incorporate ICT into educational administration, including managing ICT infrastructure and school management systems.

9. Implementing and Managing the Policy

9.1 Programme Monitoring and Evaluation Group (PMEG)

The PMEG will oversee the national ICT program's implementation in schools and collaborate with experts to develop guidelines and reports to assist States.

9.2 Inter-ministerial Group

An inter-ministerial group will guide ICT-related decisions, ensuring cost-effective and optimal infrastructure solutions.

9.3 National and State-Level Agencies
National and state agencies will develop curricula, resources, and capacity-building programs, collaborating to ensure quality standards and universal access to digital content.
9.4 Role of the States
States will define and implement the policy, ensuring its successful execution.
9.5 Programme of Action
States will develop a roadmap, including timelines and strategies, to ensure the ICT program's reach across all secondary and higher secondary schools.
9.6 Advisory Group
Each State will establish an advisory group to guide the ICT program's implementation, ensuring access to connectivity and electricity.
9.7 Norms, Standards, and Procedures
States will adopt standards and norms recommended by the inter-ministerial group for consistent and cost-effective ICT deployment.
9.8 ICT Infrastructure Models
States may implement the Build, Own, Operate, and Transfer (BOOT) model to quickly expand ICT infrastructure, ensuring up-to-date equipment and efficient resource use.

9.9 Regulatory Measures

9.9.1 While internet access is beneficial, it also increases the risk of exposure to inappropriate content and threatens the privacy and security of individuals.

such as banks, corporations, and charitable organizations.

Self-Check Exercise - 1 What is the vision of this policy in School Education?

2.3 "INFORMATION AND COMMUNICATION TECHNOLOGY IN SCHOOL EDUCATION: CHALLENGES AND ISSUES"

Access to education remains a critical concern for various sectors of society. Efforts are being made to address the challenges of creating alternative education modes, continuing education, teacher capacity building, and the establishment of information systems for more efficient school management. As I(ICT) become more accessible, reliable, and advanced, the opportunity to harness ICT for educational purposes is increasingly viable. ICT has enabled the integration broad spectrum of technology-based and technology-mediated resources for teaching as well as learning. As a result, ICT can now serve as a comprehensive support system for education. Below are some of the challenges associated with integrating ICT into school education:

Infrastructure Limitations: Many schools lack the necessary infrastructure, such as computers, reliable internet access, and maintenance support, which hinders effective ICT integration (Ratheeswari, 2018).

- **Teacher Training**: Teachers often need more training to effectively use ICT tools. This includes both technical skills and pedagogical strategies to integrate technology into their teaching (Kumar & Kumar, 2020).
- **Cost and Funding**: The cost of purchasing and maintaining ICT equipment can be prohibitive for many schools, especially in developing regions. Funding is often insufficient to meet these needs (Trucano, 2012).
- **Curriculum Integration**: Integrating ICT into the existing curriculum can be challenging, as it requires adjustments in teaching methods and assessment practices (Tondeur et al., 2017).

- **Digital Divide**: There is a significant gap in ICT access between urban and rural areas, and between socio-economic groups, leading to unequal learning opportunities (Van Dijk, 2020).
- **Resistance to Change**: Teachers and administrators may resist adopting new technologies due to comfort with traditional methods or scepticism about the benefits of ICT (Ertmer & Ottenbreit-Leftwich, 2010).
- **Cyber security and Privacy**: "The use of ICT in education raises concerns about data security and the privacy of students and teachers (Livingstone & Haddon, 2012)."

SELF-CHECK EXERCISE-2

What are some major challenges schools face in integrating (ICT) into education?

2.4 Summary: Information and Communication Technologies have facilitated the integration of a diverse range of technology-based and technology-mediated resources for teaching and learning. As a result, ICT has become a comprehensive support system for education. The advisory group will include representatives from relevant departments, a reputable engineering institute from the state, university departments, and other stakeholders, taking into account the various technical, educational, financial, and administrative tasks involved.

2.5 GLOSSARY

Cyber security: The practice of protecting systems, networks, and programs from digital attacks.

Digital Divide: The gap between individuals who have access to modern information and communication technology and those who do not.

ICT Literacy: ICT literacy refers to the capability to utilize digital technology, communication platforms, and networks for accessing, managing, integrating, evaluating, generating, and ethically communicating information, thereby enabling participation in a knowledge-based society.

2.6 ANSWERS TO SELF-CHECK EXERCISES

Self-Check Exercise- 1

This Policy seeks to equip youth with the skills to actively contribute to the creation, sustainability, fostering overall socioeconomic development and enhancing global competitiveness.

Self-Check Exercise- 2

Major challenges include infrastructure limitations, lack of teacher training, high costs, curriculum integration issues, the digital divide, resistance to change, and concerns about cybersecurity and privacy.

2.7 REFERENCES/SUGGESTED READINGS

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2.8   TERMINAL QUESTIONS

1. How does the existing "National Policy on ICT" in School Education tackle the gaps in technology access across schools?
2.   What are the major challenges schools are facing in integrating ICT into their curriculum and teaching practice.

UNIT-3

COMPUTER FUNDAMENTALS

STRUCTURE

3.0   Introduction

3.1   Learning objectives

3.2   What is a Computer?

Self-Check Exercise-1

3.3   Features of Computer

Self-Check Exercise-2

3.4   Classification of Computers

Self-Check Exercise- 3

3.5   Structure of Computer

Self-Check Exercise- 4

3.6   System Software

Self-Check Exercise- 5

3.7 Operating Systems

Self-Check Exercise- 6

3.8   Application Software

Self-Check Exercise- 7

3.9 Summary

3.10 Glossary

3.11 Answers to Self- Check Exercises

3.12 References/ Suggested Readings

3.13 Terminal Questions

3.0 INTRODUCTION

This unit introduces computers and their role in learning. Computers have become a very important tool in our daily lives and can play a significant role in teaching-learning process.

3.1 LEARNING OBJECTIVE:

you will be able to:
• Recognize the key features of a computer.
• Categorize computers based on their size, functionality, and performance traits.
• Explain the fundamental parts of a computer system.

• Discuss the significance of system software in maintaining computer functionality and optimizing performance.

• Define an operating system (OS) and its primary functions.

• Differentiate between system software and application software.

3.2 WHAT IS A COMPUTER?

It is a general-purpose machine designed to convert raw data into useful information based on instructions provided to it. It

processes data by executing an algorithm, is a sequence of instructions, to generate the desired results. Components of a computer are referred to as HARDWARE, while the instructions that guide its operations are known as SOFTWARE. The primary objective for which the computer was invented was for computing.

It is a programmable machine. It allows the user to store all sorts of information and then 'process' that information, or data, or carry out actions with the information, such as calculating numbers or organising words.

A computer is a tool for processing data. Processed data is called information. Thus, a computer is a tool that enables us to input agricultural data such as farm records or financial records and it outputs relevant information such as yield information or profits to support us in our business and daily lives. It can also be viewed as an automatic electronic device, that process and stores data. Figure 1 shows the components that make up a typical personal computer (PC) or desktop system.

Figure1: A Desktop Computer or PC

Computers can be generally classified by size and power, although there can be considerable overlap. Today's computer is a device that works with raw data, which can be either numerical or non-numerical. Therefore, a COMPUTER is:

- A high-speed calculating device capable of performing arithmetic operations.
- An electronic device that stores, retrieves, and processes data, and can be programmed with specific instructions.
- A machine made up of both hardware and software, available in various sizes and configurations.

What is a system?

A system is a set of interrelated functional parts working together for a common goal / purpose.

- **What is a Computer System?**

Yes, because it consists of functional parts that work together to produce vital information. In simple terms we could say that it consists of only three components, *hardware*, *software* and *org-ware.* Let us look at hardware first. Below is a diagram that shows you some of the most common hardware components.

Figure 2: Examples of Computer Equipment

© Michael B. Karbo 1997
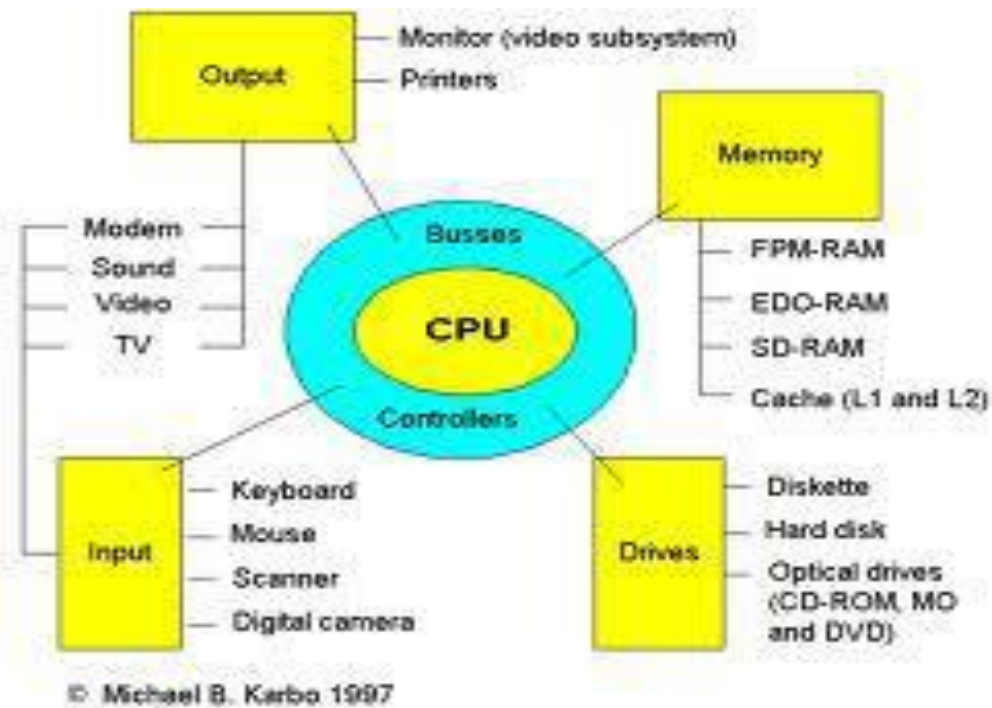
Figure 3: Computer Hardware Devices

SELF-CHECK EXERCISE-1

(i) The The primary goa lof inventing computer was to...
(ii) All components that make up a computer are referred to as...

3.3 Features of Computers

Computers have transformed our lives due to the following features:

- **Speed**: A computer can process millions of instructions per second.
- **Accuracy**: It ensures a consistently high level of accuracy in computations.
- **Storage**: The computer has a vast capacity to store data.
- **Versatility**: Although originally designed for arithmetic operations, computers can perform almost any task that follows a logical sequence of steps.
- **Diligence**: A computer does not get tired or lose focus. It maintains the same speed and accuracy continuously, with equal efficiency over time.
- **Programmable**: It can be programmed to operate automatically.
- **Large and Perfect Memory**: Every function is accurately stored over long periods.
- **Automation**: Once instructions are given, the computer follows them automatically without question.

Self-Check Exercise 2

1. List the features of a computer.

3.4   **Classification**   **of**   **Computers**
Computers can be classified into three categories based on their **type**, **purpose**, and **configuration**:

Classification Based on Type:

- **Digital Computers**:
  - Operate using digits (binary form: 0 and 1).
  - Perform operations at high speed using these binary digits.
  - Known as counting devices, they generally perform one operation—addition.
- **Analog Computers**:
  - Measure physical quantities such as temperature, pressure, or voltage, rather than working with digits.
  - They establish analog relationships between two quantities (e.g., converting petrol pumped into measurements of quantity and price).
  - They do not store large data or have extensive logical capabilities like digital computers.
- **Hybrid Computers**:
  - Combine the features of both digital and analog computers.
  - Handle both continuous and discrete data.
  - Commonly used in scientific applications, research, and industrial control.

Classification Based on Purpose:

- **General Purpose Computer System**:
  - Computers designed for everyday tasks and versatile enough to perform various functions.
- **Special Purpose Computer System**:
  - These computers are designed for specific applications such as process control in industries, desktop

publishing, air traffic control, robotics, word processing, etc.

Classification Based on Configuration/Memory Type:

- **Microcomputer System**:
  - Uses microprocessors and is available in small sizes.
  - The CPU is typically contained within a single chip or a few chips.
  - Includes personal computers (for tasks like accounting and word processing) and home computers (used for entertainment, education, or personal budgeting).
- **Mini Computer System**:
  - Designed to store and process large amounts of data.
  - Faster than microcomputers and used in industries for process control and time-sharing devices.
- **Medium-Sized Computer**:
  - Faster and with larger storage capacities compared to minicomputers.
  - Used for commercial data processing, engineering, scientific data processing, CAD, and CAM.
- **Large-Sized Computers**:
  - First to third-generation computer systems with greater data processing capacities.
  - Used for complex engineering designs, large databases, and scientific research.
- **Supercomputers**:
  - Extremely sophisticated and efficient systems with extraordinary storage capacities and processing power.
  - Used for weather forecasting, designing complex machinery, and other high-demand applications.

Self-Check Exercise 3

1. Write the classification of computers based on configuration/memory type.

3.5 " STRUCTURE OF COMPUTER"

The structure of a computer consists of the following main components:

(i)   **Input   and   Output   Devices**
(ii)   **Central   Processing   Unit   (CPU)**
(iii) **Memory Unit**

(i) Input and Output Devices

Input   Devices
Input refers to any data or instructions that a computer uses. Input devices are hardware tools that convert data, sounds, images, and actions that humans understand into a format that the system can process. Beyond the usual keyboard and mouse, various other input devices include those used for pointing, scanning, image capturing, and audio input.

- **Keyboard**
  The keyboard is a primary input device for computers. Despite the emergence of alternative input methods, the keyboard remains the most common way to enter information. Keyboards are available for desktops, laptops, PDAs, and smartphones, with different sizes and styles, from full-sized to mini versions. Typically, a computer keyboard features around 110 keys for entering letters, numbers, and special functions.
- **Pointing   Devices**
  A pointing device is a hardware interface that allows users to input spatial (continuous, multi-dimensional) data to a computer. The mouse is the most widely used pointing device. A typical mouse is a small, handheld tool that moves a pointer on the screen by sliding it across a smooth surface. Some variations include the optical mouse, which uses light instead of a ball for motion detection, and mini-mice, which

are compact versions designed for laptops. Other alternatives include trackballs, touch pads, and pointing sticks.

- **Scanner**
Scanners are devices that optically scan and convert printed text, images, or objects into a digital format. Some scanners also read text and convert it to digital code, making them useful for transforming physical documents into editable files.

- **Image   Capturing   Devices**
Image capturing devices, such as digital cameras, video cameras, and web cameras, capture images or videos and transfer them to a computer. Web cameras, for instance, allow live streaming and video conferencing over the internet.

- **Audio   Input   Devices**
Audio input devices, like microphones, convert sound into digital data for processing by the computer. These devices are essential for tasks like voice recording, dictation, and communication.

- **Monitors**
 They use various resolutions and refresh rates to render images formed by pixels. These images are a result of the computer's video output.

- **Printers**
Printers convert processed data into a permanent hard copy. These devices create documents on paper, providing a tangible output of the computer's processed information.

- **Audio   Output   Devices**
Audio output devices, such as speakers and headphones, convert audio data from the computer into sounds that humans can hear. These devices are typically connected to a sound card, which handles the playback of audio.

Before processing, a computer needs input data and instructions. After processing, the output must be displayed, and various input/output devices facilitate communication between the computer and humans, as well as between computers.

(ii) Central Processing Unit (CPU)

The CPU, often referred to as the brain of the computer, is responsible for processing input data. It is typically contained in a microprocessor, which is a single chip that performs all computations. The CPU consists of the following key components:

- **Arithmetic   Logic   Unit   (ALU)**
  The ALU handles all calculations and logical operations. It performs arithmetic operations such as addition, subtraction, multiplication, and division, as well as logical comparisons such as less than, equal to, and greater than.
- **Control   Unit**
  The Control Unit manages the transfer of data and instructions across the computer's various components. It interprets the instructions in the program and directs the system on how to execute them. Essentially, it acts as the "central nervous system" of the computer, fetching and executing instructions.

(iii) Memory Unit

The memory unit stores data, instructions, and information for the computer. Located on chips attached to the system board, memory plays a crucial role in program execution and data management. The three primary types of memory are:

- **RAM   (Random-Access   Memory)**
  RAM is volatile memory used to store data temporarily for quick access by the CPU. It enables the computer to retrieve

information at random locations, improving performance by speeding up data retrieval. RAM is cleared when the computer is turned off.

- **ROM (Read-Only Memory)**
  ROM is non-volatile memory that stores essential data and instructions permanently. It cannot be modified by the user, and its contents remain intact even when the power is turned off. ROM contains critical programs for starting up the computer.

Memory is fundamental in enabling computers to store and process information efficiently.

Self-Check Exercise- 4

(i).   Write the names of the different parts of CPU.

(ii)   What are input devices?

3.6 SYSTEM SOFTWARE

These are the programs that control and coordinate the operations of a computer. They consist of operating systems like Windows XP, Vista or Windows 10, Linux, Apple Macintosh etc. and include utility programs like an antivirus program.
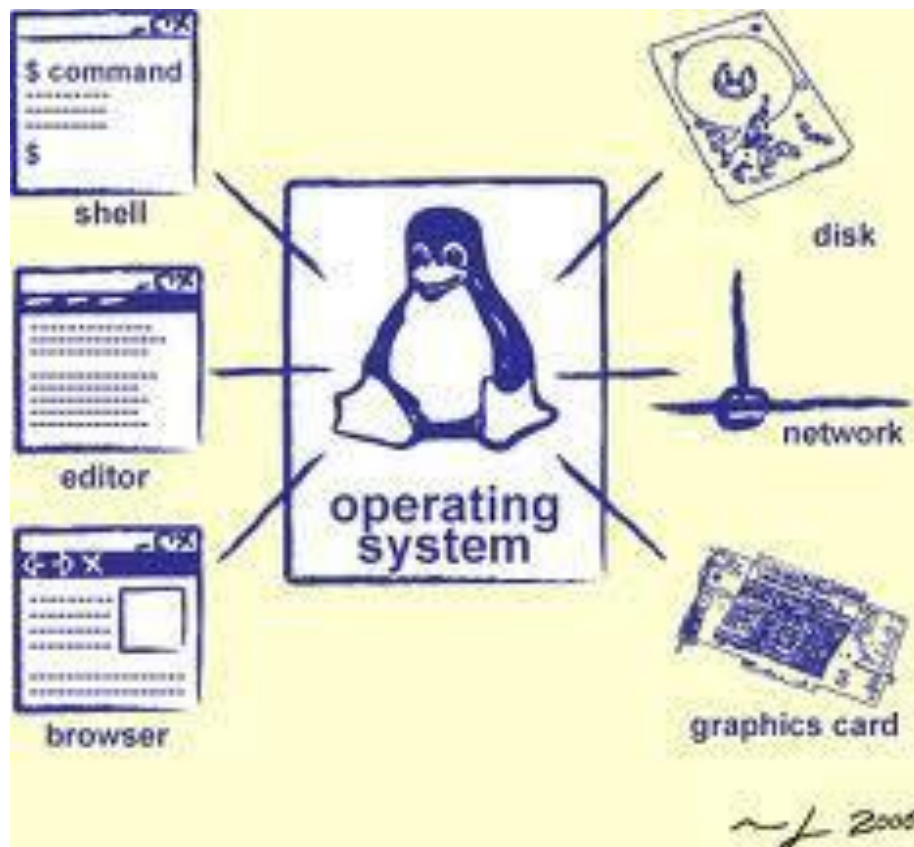
Figure 4: Illustration of how operating systems control and coordinate other computer resources

End users use application software to accomplish specific tasks. For example, we use word processors to create brochures, letters and reports. However, end users also use system software. System software works with end users, application software, and computer hardware to handle the majority of technical details. For example, system software controls where a word processing program is stored in memory, how commands are converted so that the system unit can process them and where a completed document or file is saved. System Software is not a single program. Rather it is collection or a system of programs that handle hundreds of technical details with little or no user intervention. System Software consists of four types of programs:

Operating Systems, Utilities, Device Drivers and Language Translators.

Self-Check Exercise- 5

1. Write the names of different operating systems.

3.7 OPERATING SYSTEMS

An operating system is a crucial piece of system software. It consists of a set of programs that manage and oversee the hardware of a computer, as well as provide services to application software, programmers, and users. It controls all hardware and software components, including input, output, and processing tasks, and manages the flow of information to and from the processor. The operating system also prioritizes different tasks. Without it, a computer would be unable to perform any useful operations. Upon turning on a computer, the operating system is the first program loaded into memory.

Need for an O. S.

The O.S. provides a platform on which other programs, known as application software, can run. It is designed to control and execute various applications on the computer, while also managing the computer's resources as memory, the monitor, keyboard, and printer.

The choice of O.S. largely depends on the CPU, attached devices, and the applications you wish to use. The operating system manages both system hardware and software, coordinating computer resources, offering an interface in users and the system, and running applications efficiently.

.A collection of programs that handle many technical details related to using a computer without which the computer will be useless.

Figure 5: Diagram showing how operating system controls hardware, application programs and indirectly, users

Functions of an O. S:

An operating system performs a variety of functions, with some of its key functions outlined as follows:

- **Processor Management**: This function involves managing the Central Processing Unit (CPU). The operating system allocates CPU time to different processes, a process known as scheduling. Two common scheduling techniques are used by the operating system:
    - ○ **Priority Scheduling**: In this method, each task is assigned CPU time based on its priority. Tasks with

higher priority receive CPU time before those with lower priority. The CPU continues executing the task until it is completed or interrupted by another request. A major drawback of this approach is that smaller tasks may have to wait a long time if a long-duration task with higher priority is running.

- o **Round Robin Scheduling**: This is also known as Time Sharing Scheduling. Here, each task is given a fixed amount of time to execute. The CPU continues the task until the time is up, the task completes, or an interrupt occurs. If the task isn't completed within the allotted time, it is placed at the end of the queue. This technique improves response times and provides an interactive environment, making it ideal for network environments where users share resources.
- **Device Management**: The operating system communicates with hardware and attached devices to maintain a balance between them and the CPU. This is especially important because the CPU's processing speed is much higher than that of I/O devices. To optimize CPU time, the O.S. uses two techniques:
  - o **Buffering**: Temporary storage of" "input and output" data occurs in input and output buffers. The operating system moves data between devices and buffers without interrupting the program. When the buffer is full, the program is signaled to process the data. Buffering enables overlapped processing, where the program continues to work on another buffer while data is being transferred to/from a device.
  - o **Spooling (Simultaneous Peripheral Operations Online)**: Spooling is used for managing tasks on the same input/output device, such as a shared printer in a network. Instead of making users wait for the printing process to finish, the operating system stores data

temporarily on a hard disk and sends it to the printer one by one.

- **Memory Management**: The O.S. system manages the memory used by the CPU and I/O devices. When a program needs execution, it is loaded into the main memory until completed, after which the memory is freed for other programs. Common memory management techniques include:
  - ○ **Partitioning**: The memory is divided into fixed or variable-sized partitions to accommodate multiple programs. Fixed partitions remain the same size, while variable partitions are allocated as programs are loaded. The latter reduces memory wastage but may cause fragmentation over time.

  - ○
- **File Management**: The O.S. system manages files, folders, and the directory system on a computer. Files are stored with information about their type, size, location, and access rights in the File Allocation Table (FAT). The operating system uses this information to create, edit, copy, and allocate memory to files, ensuring that files are opened with the proper access permissions.

Self-Check Exercise 6

(i). **What are the different functions of an Operating System?**
The functions of an operating system include:

- Processor management
- Device management
- Memory management
- File management

(ii). **What is the full form of SPOOLING?**
The full form of SPOOLING is **Simultaneous Peripheral Operations Online**.

3.8 APPLICATION SOFTWARE

Application software (also known as utility programs) refers to programs that users employ to complete various tasks or solve specific problems. Users install the relevant utility software based on their needs. The functions and tasks that a computer can perform are determined by the utility software that is installed. In many cases, utility software can be more expensive than computer hardware, unless the software is open source. These programs are specifically created to perform particular tasks.

Examples include **word processors** for producing documents like letters, memos and reports, **spreadsheets** for tabulation (an automatic worksheet), and **database** programs for advanced data storage and analysis.

Application software refers to a collection of programs designed to perform specific tasks. For instance, a library information system is an application package that manages various aspects of library operations, such as book details, account holder information, book issue and return records, etc. Another example is a student information system, which manages student data like roll

numbers, names, parents' details, addresses, class, section, and exam results. Application software can generally be divided into two categories:

(a) **Generalized Packages**
(b) **Customized Packages**

Generalized Packages
These are user-friendly software solutions created to meet general user needs, such as document preparation, image drawing, data management, presentation creation, and gaming. They consist of programs that provide general-purpose tools for solving specific problems. Some examples of generalized packages include:

- **Word Processing Software** (for document preparation): WordPerfect, MS-Word, OpenOffice.org Writer
- **Spreadsheets** (for data analysis): Lotus Smart Suites, MS Excel, OpenOffice.org Calc, Apple Numbers
- **Presentation Software**: Presentation Graphics, MS PowerPoint, OpenOffice.org Impress
- **Database Management Systems**: MS Access, OpenOffice.org Base, MS-SQL Server, ORACLE
- **Graphics Tools**: Paint Shop Pro, Adobe Photoshop

Customized Packages
These are software applications tailored to meet the specific needs of an organization or institution. Examples include student information systems, payroll systems, and inventory control systems. Customized packages are developed using high-level programming languages to address the unique requirements of the users.

Common utility software installed on a computer: -

- Office programs - OpenOffice.org, Microsoft Office

- Antivirus programs – Avira, Sophos, Kaspersky, etc.

- Internet browser: Mozilla Firefox, Microsoft Internet Explorer, Opera, Safari etc.

- Programs for image editing: Adobe Photoshop, Canvas, CorelDraw, Draw etc.

Self-Check Exercise- 7

1.Types of application software- ⎯⎯

a. three

b. four

c. five

d. two

3.9 Summary A computer allows users to store and process information quickly and automatically. It is a machine that can receive and store information and change or process it. Thus, a computer is a tool that enables us to input agricultural data such as farm records or financial records and it outputs relevant information such as yield information or profits to support us in our business and daily lives. In simple terms we could say that it consists of only three components, *hardware*, *software* and *org-ware.* Let us look at hardware first. Below is a diagram that shows you some of the most common hardware components.

3.10 GLOSSARY

Algorithm: An algorithm refers to a finite and well- defined sequence of steps, rules or instructions designed to perform different calculations or other problem-solving operations.

Hardware: The physical components of which a computer is made up of is known as hardware.

Software: Software in computer refers to different set of programs, applications, data or files that tell the computer how to perform specific tasks.

SPOOLING: It stands for Simultaneous Peripheral Operation Online.

3.11 ANSWERS TO SELF-CHECK EXERCISES

Self-Check Exercise- 1

(i)   Calculation

(ii)   Hardware

Self-Check Exercise- 2

Features of Computer:

a. Speed

b. Accuracy

c. Storage

d. Versatility

e. Diligence

f. Programmable

g. Large and Perfect Memory

h. Automation

Self-Check Exercise- 3

Classification of computers based on configuration/memory type:

(a) Microcomputer system

(b) Minicomputer system

(c) Mediumsized computers

(d) Large sized computers

(e) Super computers

Self-Check Exercise-4

(i)   . Different parts of CPU are:

    (a) Arithmetic Logic Unit (ALU)

    (b) Control Unit (CU)

    (c) Memory Unit (MU)

(ii)   Input devices are hardware components that allow users to interact with a computer by providing data or commands. Examples include keyboards for typing, mice for pointing and clicking, scanners for converting physical documents to digital format, and microphones for audio input. These devices enable users to input information into the computer system for processing.

Self-Check Exercise-5

1. Windows XP, Vista or Windows 10, Linux, Apple Macintosh are the different types of O.S..

Self-Check Exercise-6

1. Different functions of an O. S. are:

(a) Processor Management

(b) Device Management

(c) Memory Management

(d) File Management

Self-Check Exercise-7

1. two

3.12 References/ Suggested Readings

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3.13 Terminal Questions

1. What is a computer?

2. Describe the features of a computer.

3. Explain the Classification of Computers.

4. Describe the Structure of Computer.

5. Explain the different Input Devices.

6. Explain the different Output Devices.

7. What do you mean by application software?

UNIT-4

Computer Application in Learning

STRUCTURE

4.0   INTRODUCTION

In today's digital age, computer applications play a significant role in the teaching-learning process. This unit will throw light into the

concept, features, and advantages of MS Word, MS Excel, and MS PowerPoint, providing a comprehensive understanding of how these applications can be utilized to improve learning outcomes.

4.1 Learning Objectives

Learners will be able to:

- Understand the purpose and basic functionality of Microsoft Word .
- Recognize the benefits of using MS Word.
- Discuss the advantages of Excel.
- Explain Microsoft PowerPoint as presentation software.
- Highlight the benefits of using PowerPoint.

4.2 MS Word- Concept, Features and Advantages

M.S. Word is a word processing software that can be used to create almost any kind of text document one can think of. From blogs to eBooks to postcards, this type of software allows even novice computer users to create professional looking projects, such as flyers, ads, webpages, tables, charts, word art and drawings at home or in the office. Many people are familiar with the basics of word processing, but there are tons of options and additional features that can really take a document from fine to fantastic.

Microsoft Word has become the recognized standard in word processing software, but there are several other alternatives that might be considered.
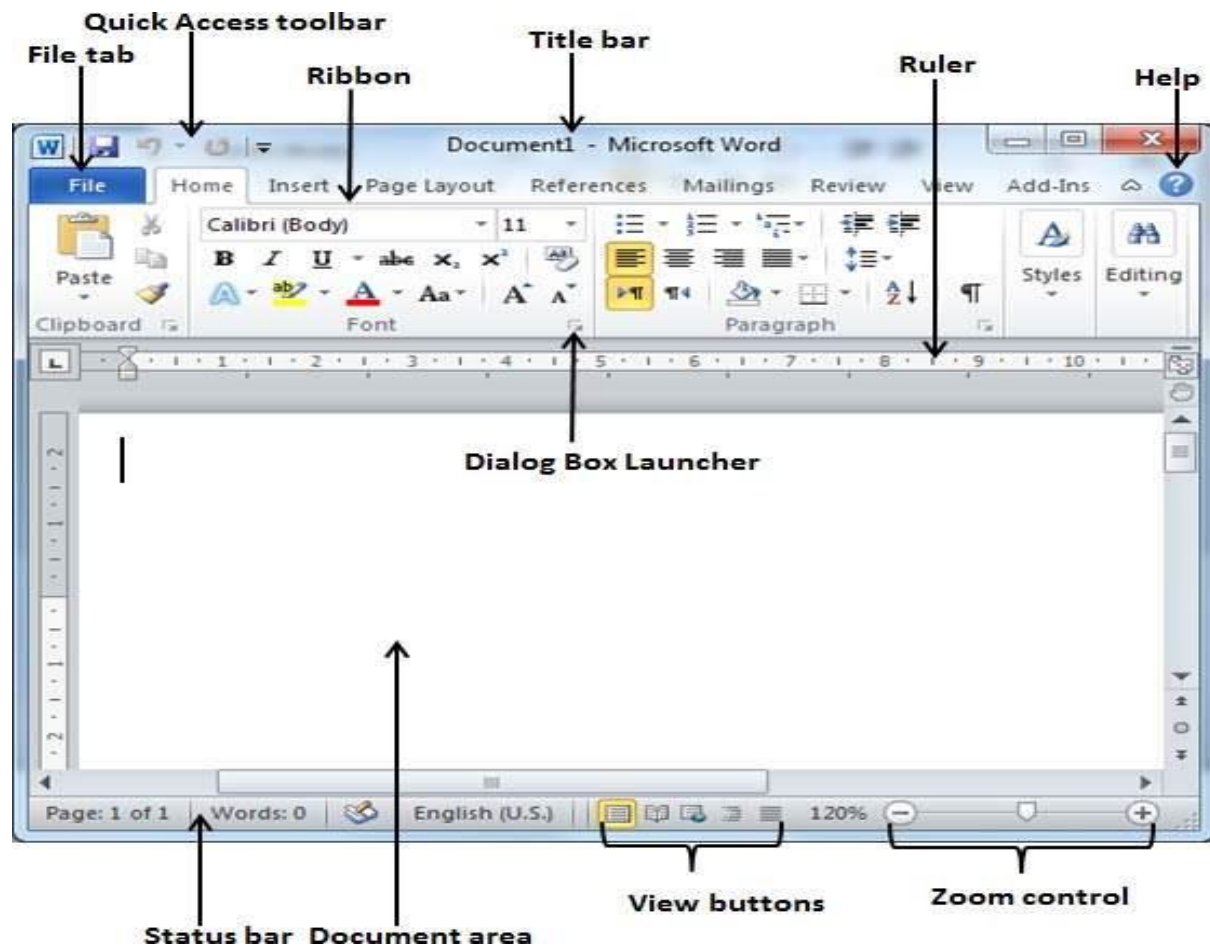
Figure 1: MS WORD

Features of MS Word

Following are the essential features of MS Word:

- Automatic formatting options such as headings, quote blocks and titles.
- A "clear all formatting" option to make copy and pasting from

other documents easier.

- Multiple font choices that include familiar standbys such as Times New
  Roman, Calibri and Arial, etc.
- Rulers and gridlines to make setting margins and aligning text and photos easier
- Drawing tools
- Photo and graph insertion tools
- Various templates to choose while creating documents
- The ability to save a document in common document types, such as .txt,
  PDF and .doc.

Here is some more in-depth information about basic and more advanced features common to the best word processing programs.

- **Insert Text**: Enables the addition of text at any point in the document.
- **Delete Text**: Allows for the removal of characters, words, lines, or entire pages.
- **Cut and Paste**: Lets you remove (cut) a section of text from one location and insert (paste) it elsewhere.
- **Copy**: Allows you to duplicate a portion of text.
- **Page Size and Margins**: Provides the ability to set page sizes and margins, with automatic text adjustment to fit the settings.
- **Search and Replace**: Allows you to search for specific words or phrases and replace one set of characters with another throughout the document.
- **Word Wrap**: Automatically moves to the next line when the current line is filled, and adjusts text when margins change.

- **Print**: Sends the document to a printer for a hardcopy output.
- **Font**: Lets you modify the font style, size, and apply formatting like bold, italics, or underlining within the document.
- **Footnotes and Cross-references**: Automatically handles the numbering and placement of footnotes, as well as cross-referencing other sections in the document.
- **Graphics**: Allows embedding of illustrations and graphs, with some word processors enabling the creation or insertion of graphics from other programs.
- **Headers, Footers, and Page Numbering**: Customizes headers and footers to appear at the top and bottom of every page, with automatic page numbering that can be positioned as desired.
- **Layout**: Provides the ability to set different margins and specify paragraph indentations within a single document.
- **Spell Checker**: Automatically checks the spelling of words, highlighting any unrecognized words.
- **Table of Contents and Indexes**: Automatically generates a table of contents and index based on inserted special codes.
- **Thesaurus**: Built-in tool to find synonyms directly within the word processor.
- **Windows**: Enables editing multiple documents simultaneously, with each appearing in a separate window.
- **Word Count**: Counts the total number of words and characters in the document.

Educational Applications of MS Word

- MS Word could be effectively used to prepare letters and letterhead, memos, reference documents, school

assignments or work being completed at home or for Creative writing like short stories, poemsor personal correspondence.
- Used to create resumes and greeting cards.

- Teachers Word processing enables faster corrections to documents compared to using a typewriter or making changes by hand.
- With the advent of Google Docs, both teachers and students can now create, edit, and collaborate on documents in real time, making it easier to work together.
- Word processing simplifies the sharing of materials among teachers through web-based platforms, allowing everyone to edit and refine documents. Teachers can exchange lesson plans, worksheets, and adjust them to suit their specific needs.
- For teachers, it offers an efficient way to create resources that can be saved and reused whenever needed.
- As part of the writing process,

- the facility of rewriting, inserting and deleting text offered by a word processor gives the pupils more freedom.
  It helps develop fluency in their writing. Spell check facilities in word processing packages allow the pupils to revise their work and self correct common mistakes.
- Word processing enhances the presentation standards of pupils' work.
- Word processing encourages pupils to refine and present their ideas more effectively and in different ways.
- Teachers may create lesson plans and schemes from a template.
- The teacher can create classroom resources that may be shared with others and customized for individual use.

- Word processing allows digitally printed copies of pupils' work to be created and displayed throughout the school.
- Writing process is easier and efficient using a word processor.

Self-Check Exercise-1

1. Enlist any five essential features of MS Word.

4.3 MS Excel- Concept, Features and Advantages

Microsoft Excel is a spreadsheet application designed for managing data, such as organizing, analyzing, and storing information in tabular form. It mimics a paper accounting worksheet, presenting data in rows and columns. Excel is used to capture, display, and manipulate data arranged in this grid format.

A spreadsheet consists of a document that organizes data in horizontal rows and vertical columns. Rows are typically labeled with numbers (1, 2, 3, etc.), while columns are labeled with letters (A, B, C, etc.). For instance, each row in a spreadsheet could represent a student, and each column might contain different information about the student, such as their name, address, age, gender, and marks. The spreadsheet program can then analyze this data, such as counting the number of students in a particular class, listing all the students who have above average score, by performing other calculations. The scores in one column can be converted to percent by applying the formula and be entered in another column. Once the formula has been created, modifying the value of just the cell will also change the percentage in the corresponding column.

Microsoft Excel (spreadsheet software) allows for multiple sheets, which can present data in both text and numerical formats, or as graphs. It is highly useful for performing basic arithmetic and mathematical functions, as well as common financial and statistical operations. Calculations such as averages or standard deviations can be applied to tabular data using pre-programmed functions within formulas.
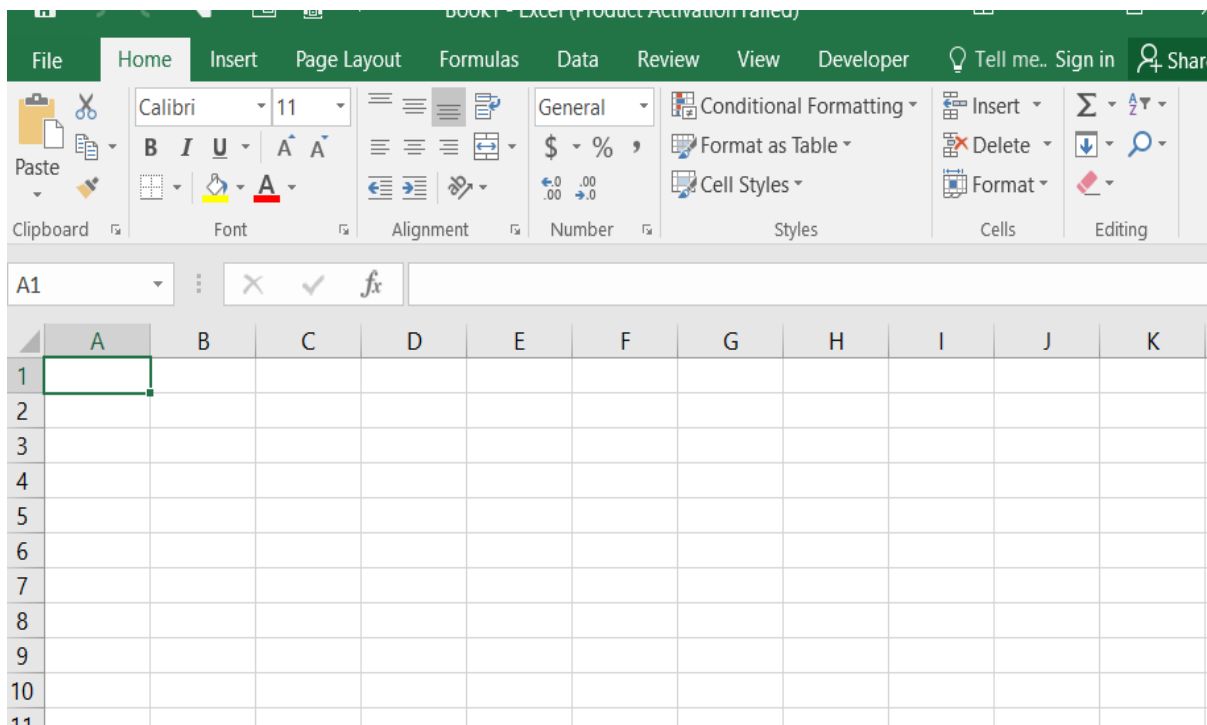
Figure 2: MS Excel

Features of Microsoft Excel (Spreadsheet)

. **Values**: Values can be entered directly into a cell by typing on the keyboard, or they can be derived from a formula that performs

a calculation, displays the current date or time, or retrieves external data like values from a database.

Real-time Update: This feature refers to the periodic update of a cell's content with data from an external source, such as a cell in a remote spreadsheet. In shared, web-based spreadsheets, it ensures immediate updating of cells when another user makes changes. All dependent cells must also be updated.

Locking a Cell: Once data is entered, specific cells or the entire spreadsheet can be "locked" to prevent accidental changes. This is typically applied to cells containing formulas but used for cells with constant values. The locking feature can be activated in the file preferences.

Data Format: A cell or range can be defined to control how the value is displayed. By default, the display format is determined by the initial content, unless a specific format is applied. For example, entering "11/02/2017" or "11 Feb 2017" automatically formats the cell as a date.

Formula: A cell can contain either a value or a formula, or it can remain empty. A formula defines the calculation that produces the result in the cell. Cells containing formulas show both the formula and the result. The formula is visible when the cell is selected, but the result is displayed otherwise.

Charts: Many spreadsheet applications allow you to create charts, graphs, or histograms from selected groups of cells. These charts update automatically as the data changes. The generated graphic can be embedded in the current sheet or added as a separate object.

Educational Applications of MS Excel (Spreadsheet Software)

- Spreadsheet software can be used in a variety of ways in the classroom, making teachers' work more efficient.
- It is more effective than using a paper gradebook for tracking student information.
- Spreadsheets simplify the process of calculating student grades and class averages.
- Teachers can quickly generate charts to visually represent data, such as pie or bar charts, for easier analysis.
- Teachers can create weekly spreadsheets to show students their homework assignments.
- Schools can provide grade-recording software or a website where teachers can enter and store grades.
- Teachers can use spreadsheets with students to track data like daily temperatures or manage accounting for a classroom business.
- With formulas in MS Excel (e.g., average, sum, standard deviation), teachers can perform complex calculations quickly and efficiently. For instance, a physical education teacher can use a spreadsheet to compare daily calorie intake with weight changes, showing the relationship between the two.

Self-Check Exercise-2

(i)   MS Excel is a...............................application program.

(ii)   A spreadsheet is a document that stores data in a grid of horizontal rows and vertical columns. (True/False)

4.4 MS PowerPoint- Concept, Features and Advantages

Microsoft PowerPoint is a Presentation software that supports presentation of information by creating sequences of words and pictures.

The programs make it possible to combine text and graphic elements to convey information. It can be used to teach a new or complex concept to a group of students, or for presenting a proposal to a group. It has three major functions: an editor that allows text to be inserted and formatted, inserting and manipulating graphic images, and a slide-show system to display the content.Presentation software includes Multimedia authoring tools allow you to create more advanced presentations that incorporate audio and video elements.
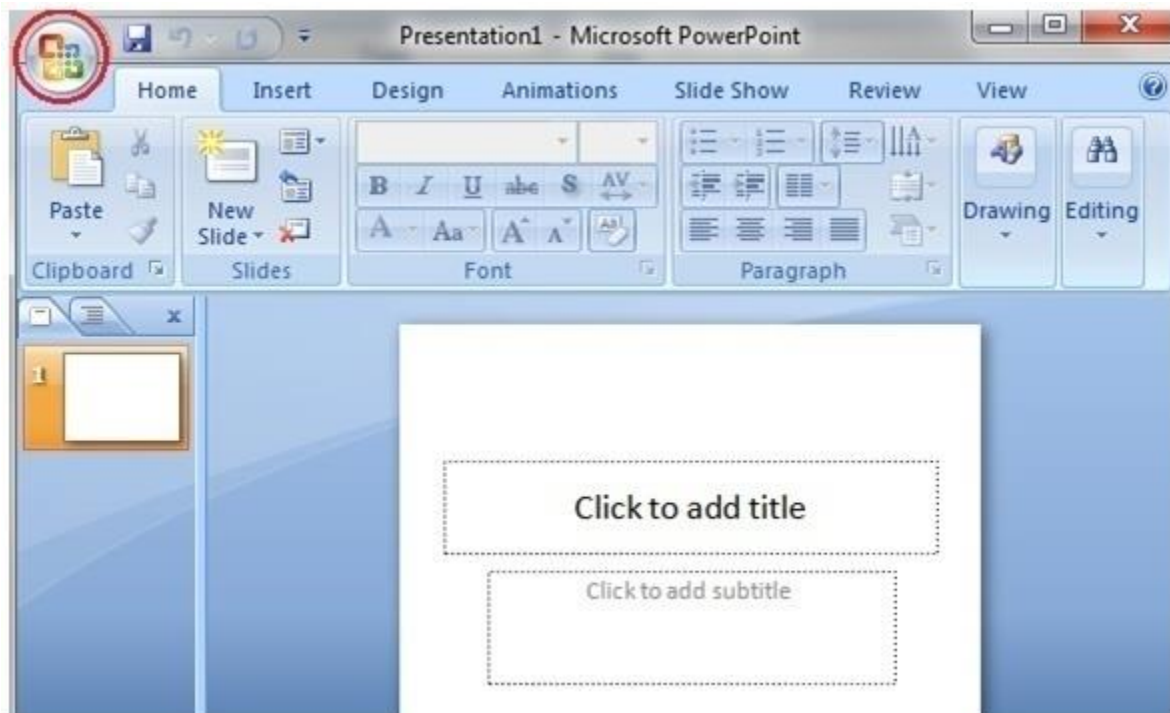
Figure 3: MS PowerPoint

Features of MS PowerPoint

Slide Layouts: Multimedia authoring tools allow you to create more advanced presentations that incorporate audio and video elements.

Slide Background Colors and Graphics: Backgrounds can be added to individual slides or The background for all slides in a presentation can be set to solid colors, gradient colors, textures, or images.

Themes Design in Presentation software: A really nice feature of the design themes, is that you can immediately see the effect reflected on your slides, before making the decision.

Add Clip Art or Pictures: PowerPoint provides various methods to insert clip art and pictures into a presentation. The simplest way is by choosing a slide layout that includes a content placeholder for clip art or pictures.

Modify Slides: PowerPoint allows for customization of slides and slide layouts, including adding, deleting, or rearranging slides as needed.

Slide Transitions: Slide transitions add dynamic movement as the presentation progresses from one slide to the next.

Adding Animation: Animation refers to the movement applied to objects on a slide (not the slides themselves). One or more objects can be animated to add interest and engagement to the presentation.

Educational Applications of MS PowerPoint (Presentation Software): • In the past, teachers used transparency sheets and overhead projectors for presentations. With presentation software, teachers can now utilize computers and projectors with enhanced features. • Teachers can create interactive slides for presentations or student activities, incorporating multimedia elements like audio clips, video clips, photos, and charts— resources that paper worksheets or textbooks cannot offer. • Teachers can share presentation files with students, reducing the need for note-taking and helping students focus on the content being discussed. This approach benefits many students by enhancing their engagement. • Students can also utilize presentation software in various ways, such as creating presentations instead of writing papers.

Self-Check Exercise-3

(i)   MS PowerPoint is a ....software.

(ii)   Each page in a PowerPoint presentation is called a...........................

4.5 Summary Presentation software is a tool used to create and display visual presentations which are usually delivered in the form of a slide show. The programs make it possible to combine text and graphic elements to convey information. The spread sheet program can analyse this data by counting the number of students in a certain class, listing all the students who have above average score, by performing other calculations. Word processing enables easy sharing of materials among teachers using web-based word processing, allowing everyone to edit and refine documents collaboratively. Teachers can exchange lesson plans and worksheets, modifying them as needed to suit their individual requirements.

4.6 Glossary

Word Processor: A type of application software used to create, edit, format, save, and print documents.

Spreadsheet: Also known as a worksheet, it is an application software that consists of cells arranged in rows and columns, where data can be entered, calculated, organized, analyzed, and stored in a tabular format.

Presentation Software: A type of application software designed to present information through slideshows that include text, images, videos, graphics, charts, and other multimedia elements.

4.7 Answers to Self-Check Exercises

Self-Check Exercise-1

Some of the essential features of MS Word are:

- **Insert text:** Allows to insert text anywhere in the document.
- **Cut and paste:** Allows to remove (cut) a section of text from one place in a document and insert (paste) it somewhere else.
- **Graphics:** Allows to embed illustrations and graphs into a document.Few word processors lets to create illustrations; few enable to insert an illustration produced by a different program.
- **Spell checker:** Allows to check the spelling of words. It highlights any word that it does not recognize.
- **Font:** Allows to change fonts within a document. For example, one can specify bold, italics, and underlining. Word processors allow to change the font size and even the

typeface.

Self-Check Exercise-2

(i)   Spreadsheet

(ii)   True

Self-Check Exercise-3

(i)   Presentation

(ii)   Slide

4.8   References/Suggested Readings

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4.9 : Terminal Questions:

Describe the educational uses of MS Word.

☐ What is MS Excel? Discuss its features.

3. Describe the concept, features and advantages of MS PowerPoint.

Unit-5

Hardware Technologies and their Applications: Overhead Projector (OHP), Slide Projector
Structure:

5.1-Introduction

5.2-Learning Objectives

5.3- Overhead projector

    Self-Check Exercise--1

 5.4-Slide projector

    Self-Check Exercise-2

5.5- Summary

5.6-Glossary

5.7- Answers to self-check exercise

5.8- References and suggested readings

5.9- Terminal Questions

5.1-Introduction:

Educational technology can be conceived as a science of techniques and methods by which educational goals can be

realized. It helps in specifying the goals and translating them in to behavioral terms. The audio sense is more active by the use of teaching aids. The use of tape recorder, radio, record player and gramophone make the learner more active and attentive in teaching process. The visual sense is more active by the use of models and line –drawing in his teaching activities. Motion picture films can be classified as entertainment films and educational films. Classroom films are on curricular subjects produced for promoting learning in specific curricular subjects. A slide projector is a specialized projector which has been designed to be used with slides.

5.2-Learning Objectives: After reading this chapter, the students will be able to know about:

Meaning, concept and characteristics of overhead projector

Meaning, concept and characteristics of slide projector

5.3- Overhead projector:

 An overhead projector is a type of slide projector used to display images to an audience. Also known as a "viewgraph," it was invented by Jules Duboscq, a French inventor, in the 1870s. Initially used for police work, it featured a cellophane roll over a 9-inch stage to display facial features. The U.S. Army adopted it for training in 1945, and by the late 1950s and early 1960s, it became widely used in schools and businesses.

Similar to a 35mm slide projector, the overhead projector projects light through a transparency placed on a glass plate onto a

screen, forming a real image. However, because of the larger size of the transparencies (typically the size of a printed page), a mirror is placed before or after the focusing lens to adjust the optical system horizontally. This mirror also reverses the image, so the projected image matches what the presenter sees.

The overhead projector relies on an optical condenser, typically a Fresnel lens, to direct light towards the focusing lens. This helps ensure proper illumination of the transparency. The system uses a high-intensity bulb, often requiring fan cooling to prevent overheating.

The focus adjustment of the projector is manually controlled, allowing the user to raise or lower the lens to adjust the image's sharpness. Changing the projection distance affects magnification and light intensity, so the focus must be readjusted accordingly.

Overhead projectors typically use high-power halogen lamps, which can consume up to 750 watts and require cooling to prevent overheating. These bulbs, however, burn out quickly, often within 100 hours. Modern projectors, in contrast, use arc lamps, which last much longer but require a warm-up period.

In educational settings, overhead projectors are cost-effective tools for creating an interactive learning environment. Teachers can pre-print teaching materials on plastic sheets, which can be written on using washable markers, saving time compared to preparing materials manually for each class. The projector allows teachers to face the class while writing comfortably, making communication easier. Once the transparency is full, it can be replaced with a fresh one. The ability to reuse and wash the transparencies adds to its efficiency.

The overhead projector also facilitates a controllable space for teaching, allowing the teacher to write or draw while maintaining eye contact with the students.

of teaching techniques so that an instructor may (1) prepare, in advance, handwritten sheets of film--test questions, pupils' sentences, quotations, short poems--to be shown in any order or form; (2) use pictures, graphics, or cartoons as subjects for creative composition; (3) write comments on a prepared text or a pupil's composition transferred to film; or (4) create diagrams or symbols to aid in the discussion of a composition. Although there are many advantages to an overhead projector, it is limited because only a short passage of a composition can be shown at one time, large print must be used, and the materials must be read line by line from the screen. However, the value of the overhead lies in the teacher's increased ability to control the visual content of his message without total reliance upon oral directions and repetitions.

Advantages of Overhead projector:-

1. Large image: It projects a very large image on the screen from a minimum of projection distance.

2. Face the class: In this projector the image is projected over the shoulder of the teacher. Therefore, he can face t5he class at all times. He can maintain eye contact with the students**.**

3. Lighted room: Overhead projector can operate in an illuminated (well-lighted) room. There is no need of darkening the room.

4. Bright image: The lens and mirror arrangement in overhead projector makes a problem to have a bright image even in a well lighted room.

5. Simple room: It is simple, easy and convenient to operate the overhead projector. It does not need a separate projector operator or the instructor.

6. Light weight: The light weight of equipment makes it portable.

7. Class control: the teacher can maintain complete class control and interest in a lesson by turning a switch on or off. He, while sitting on his desk, can indicate specific items on the screen by locating them with his pencil on the slides.

8. Process on the screen:- By putting a piece of ground glass over the slide space, the teacher can draw the diagram, sketch with pencil or wax pencil and the class can watch the process on the screen.

9. Large slide: Due to largeness of its aperture it may allow the use of large slide of the size 20*20 cm. or 25*25 cm. It may facilitate the preparation of art word slides**.**

10. User of pointer: The teacher can use a pointer or pencil to point out important details of a slide. He has not to run about the machine to the wall to explain this to the students.

11. Low cost: Effective visual can be made in a minimum of time and at low cost. Once a transparency is made, it is permanent. It need not be erased as in a blackboard. It can be stored for recall at any later time.

12. Preparation and presentation of transparencies: Transparencies can be prepared ahead of time, presented exactly when required and quickly removed, when they have served their purpose.

In conclusion, the overhead projector is a commonly used tool in classrooms and other educational settings. It serves as a medium for projecting still visual materials onto a screen. This simple device does not require special training to operate effectively. The use of an overhead projector can be broadly categorized into two areas: the structure and operation of the instrument, and the preparation and use of the transparencies.

Self-Check Exercise--1

Q-1**:** What do you mean by OHP?

Q-2: Write two advantages of OHP.

Q-3The……….are used to present using overhead projectors.

   a) Acetate film transparent sheet
   b) Paper sheets
   c) Polythene sheets
   d) Butter paper

Q-4 The person who invented the OHP was:

a) A French inventor

b) A Russian inventor

c) A American inventor

d) All of the above

5.4-Slide projector

A slide projector is a mechanical device used to display photographic slides. The 35 mm slide projector, which evolved from the larger-format magic lantern, became widely popular in the 1950s as a form of home entertainment. Families and friends would gather to watch slide shows, typically featuring vacation or family event photos. Slide projectors were also commonly used in educational and institutional environments.

However, photographic film slides and projectors have largely been replaced by digital image files stored on media, which are then displayed using video projectors or large-screen video monitors.

A slide projector consists of four main components:

- An electric incandescent light bulb or other light source (usually fan-cooled)
- A reflector and condensing lens to direct light onto the slide
- A slide holder
- A focusing lens

Often, a flat piece of heat-absorbing glass is placed between the condensing lens and the slide to protect the slide from heat damage. This glass allows visible light to pass through while

absorbing infrared light. The light travels through the transparent slide and lens, enlarging the image, which is then projected onto a flat screen for the audience to view. Alternatively, the image can be projected onto a translucent rear-projection screen, commonly used for automatic displays or close viewing. This method prevents interruptions from shadows cast by the audience or from people bumping into the projector.

r.

Characteristics of slide projector:

Slide projector is a specialized projector which has been designed to be used with slides. Slides are small transparencies mounted in sturdy frames which are ideally suited to magnification and projection, since they have a very high resolution and a resultingly high image quality. The use of slide projectors is in decline, as other projection methods have become more popular.

There are several different components to a slide projector, starting with a slot where slides can be inserted. Many slide projectors are designed to work with carousels, circular racks of slides which can be rotated to allow a sequential projection of images which may be automatic, or controlled with a button or remote operated by the user.

The rack for slides is surrounded by a light source and focusing lenses which ensure that the light passes through the slide, and allows for focusing so that the slides will appear crisply on the projection screen. Slide projectors can be adjusted to project at a variety of distances, with the use of focusing tools. The device also classically includes a fan to ensure that the workings of the slide projector do not get too hot, as heat can damage the slides.

At one time, the slide projector was the presentation method of choice when visual media needed to be presented to a large

group. Travelers often took photographs on slide film for the express purpose of holding slide shows of their trips when they returned, and slides could also be prepared for business and educational presentations. In an art history course, for example, the teacher might use slides of famous works of art to display examples for discussion.

Slides are actually a great presentation tool, because of the very high image quality. However, slide projectors can be difficult to work with, especially in the case of carousel projectors, which can become recalcitrant with time. It is also difficult to remember to insert the slides properly so that the images are not reversed or inverted, and to organize the slides in order. As many people who have made presentations with a slide projector know, one of the worst things which can happen is dropping the carousel on the way to the presentation podium, causing all the slides to fall out.

Because slides can be difficult to work with, other projection methods such as projectors designed to link to computers or read presentations from CDs and DVDs have become more commonplace. These projectors may be of lower quality, but they are simple enough for almost anyone to operate.

Advantages of using slides:

- Slides allow students to catch up on sleep, as they don't require constant focus and can rest during the presentation.
- Slides reduce student-teacher interaction, which is beneficial in an era where many prefer less direct engagement.
- With slides, students are less likely to take notes, saving on paper and ink.
- Slides can help maintain a sense of simplicity, allowing students to avoid overloading on information.

Self-Check Exercise-2

Q-1: What do you mean by slide projector?

Q-2: A slide projector is a specialized device designed to be used with photographic slides.

5.5 Summary: A slide is a photographic transparency that can be projected. These slides are usually of a specific size and can be individually mounted for use in a projector or for viewing via transmitted light. Slides may be in color or black and white. In overhead projection, a transparent visual is placed on a horizontal stage above the light source. The light passes through the transparency and is then reflected at a 90-degree angle onto a screen behind the presenter. Overhead projectors typically consist of a projected lamp as the light source and condensing lenses that focus the light into a usable beam.

5.6: Glossary:

Condense: To make shorter in length

Transparent: That you can see through

Assembly: The action of fitting the parts of something together

5.7: Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: An overhead projector is a type of slide projector designed to display images to an audience. Also known as a "viewgraph," it was invented by Jules Duboscq, a French inventor, in the 1870s.

Ans-2: Bright image: The lens and mirror arrangement in overhead projector makes a problem to have a bright image even in a well-lighted room.

Simple operation: It is simple, easy and convenient to operate the overhead projector. It does not need a separate projector operator or the instructor.

Ans-3: Acetate film transparent sheet

Ans-4: A French inventor

Self-Check Exercise-2

Ans-1: A slide projector is a mechanical device used to display photographic slides.

: Slides

5.8References and suggested readings:

^ *"How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.*

^ *Texas Instruments. "DLP3010 Mobile HD Video and Data Display Description & parametrics". Retrieved 2014-10-13.*

^ The Great Technology War: LCD vs. DLP. By Evan Powell, December 7, 2005. Accessed online at: http://www.projectorcentral.com/lcd_dlp_update7.htm?page=Rainbow-Artifacts. Accessed on Dec. 27, 2011.

5.9-Terminal Questions:

Describe the use of overhead projector (OHP) for still pictures. Indicate the use of still pictures in classroom teaching.

Discuss the characteristics of slide projectors.

Unit-6

DLP Projector, Movie Projector

Structure:

6.1-Introduction

6.2-Learning Objectives

6.3- Digital Light Processing

    Self Check Exercise-1

 6.4- Movie projector

    Self Check Exercise-2

6.5- Summary

6.6- Glossary

6.7-Answers to Self-Check Exercise

6.8- References and suggested readings

6.9- Terminal Questions

6.1-Introduction:

Educational technology can be conceived as a science of techniques and methods by which educational goals can be realized. It helps in specifying the goals and translating them in to behavioral terms. The DLP chip features an exceptional 16-microsecond response time, delivering users with sharp, precise images. Picture millions of tiny mirrors rapidly switching on and off faster than the speed of light. With such a high switching speed, DLP technology produces a clear, razor-sharp image with no lag

between frames. Movies, games, and fast-paced educational content are displayed with crisp, vivid detail, no matter how fast the action. Today, traditional film projectors are considered outdated, as high-resolution digital projectors offer numerous advantages. For instance, digital projectors have no moving parts except for fans, can be controlled remotely, and are compact in design. They also make content storage and distribution much simpler, more affordable, and more reliable, with the added ability to display live broadcasts. Recently, CCTV technology has evolved, focusing on internet-based systems and other technological innovations. The first movie projector, the Zoopraxiscope, was invented by British photographer Eadweard Muybridge in 1879. This device projected images from rotating glass disks in quick succession, creating the illusion of motion.

The stop-motion images were initially painted onto the glass, as silhouettes. A second series of discs, made in 1892-94, used outline drawings printed onto the discs photographically, then colored by hand. Projectors are sometimes called "front projectors" or "two-piece projection systems" in reference to the fact that a projector is typically used with a separate screen that is either mounted on a wall or hung from a ceiling. However, these days many users of the more Inexpensive projectors simply shine the picture on a white wall to save the cost of the screen.

6.2-Learning Objectives: After reading this chapter, the students will be able to know about:

DLP and its use in education

Meaning and concept of movie projector

 6.3- Digital Light Processing

Digital Light Processing (DLP) is a display technology that relies on optical micro-electro-mechanical systems, using a digital micromirror device. It was developed in 1987 by Dr. Larry Hornbeck of Texas Instruments. While Texas Instruments created the DLP imaging device, the first DLP-based projector was launched by Digital Projection Ltd in 1997. Both Digital Projection and Texas Instruments received Emmy Awards in 1998 for their contributions to DLP projector technology. DLP is used in a wide range of display applications, from traditional static displays to interactive ones, as well as in non-traditional embedded uses like medical, security, and industrial applications.

DLP technology is found in DLP front projectors (typically used in classrooms and businesses), DLP rear projection televisions, and digital signage. It also accounts for approximately 85% of digital cinema projection and is used in additive manufacturing, where it serves as a power source in some 3D printers to solidify resins into 3D objects.

Smaller "pico" chipsets are used in mobile devices including cell phone accessories and projection display functions embedded directly into phones.

Digital micro-mirror device:

In DLP projectors, the image is created by microscopically small mirrors laid out in a matrix on a semiconductor chip, known as a Digital Micromirror Device (DMD). These mirrors are so small that DMD pixel pitch may be 5.4 µm or less.[2] Each mirror represents one or more pixels in the projected image. The number of mirrors in a DLP projector corresponds to the resolution of the projected image, often half as many mirrors as the advertised resolution due to a technique called wobulation. Common DMD sizes include 800×600, 1024×768, 1280×720, and 1920×1080 (HDTV).

These mirrors can be rapidly repositioned to reflect light either through the lens or onto a heat sink (referred to as a "light dump" in Barco terminology).

By quickly toggling the mirrors between these two positions (effectively on and off), grayscale levels are produced, controlled by the ratio of on-time to off-time.

Color in DLP Projection: DLP projection systems create color images using two primary methods: one for single-chip DLP projectors and one for three-chip projectors. Additionally, a third method involving sequential illumination by three colored light-emitting diodes is being developed and used in some Samsung televisions.

In single-chip DLP projectors, color is produced either by placing a color wheel between a white lamp and the DLP chip or by using individual light sources like LEDs or lasers to generate primary colors. The color wheel is divided into several sections: the primary colors (red, green, blue), and often white or transparent (clear). Newer systems may use the primary subtractive colors—cyan, magenta, and yellow—in place of white, which is part of the "Brilliant Colour" system that combines both additive and subtractive colors to produce a wider spectrum of colors on screen.

The DLP chip synchronizes with the rotation of the color wheel so that each primary color is displayed on the DMD chip as the relevant color section passes in front of the lamp. This occurs at such a high rate that the viewer perceives a full-color image. Older models achieved this at one rotation per frame, but current systems can run up to 10 times the frame rate.

The black level in a single-chip DLP projector depends on how the unused light is handled. If unused light is scattered and dissipates within the DMD/lens chamber, it can appear as a dim

gray on the screen when the image is dark. Better contrast and deeper blacks are achievable by directing unused light away from the DMD/lens chamber and preventing internal reflections.

Three-Chip Projectors: A three-chip DLP projector uses a prism to split the light from the lamp into separate primary colors, which are each directed to a specific DLP chip. These colors are then recombined and projected out through the lens. Three-chip systems are typically found in high-end home theater projectors, large venue projectors, and digital movie theaters.

According to DLP.com, three-chip projectors used in movie theaters can produce up to 35 trillion colors. While the human eye can detect approximately 16 million colors, this high precision does not mean three-chip DLP projectors can display every color within the visible spectrum, as it's impossible for any system that uses only three base colors to reproduce the entire range. In contrast, single-chip DLP projectors offer flexibility in primary color selection, using a fast-moving color filter wheel, which provides the potential for a broader color gamut.

Advantages of DLP technology:

The advantages of DLP technology are given as under:

All digital display from DLP chip:

DLP technology is a revolutionary display solution that uses an optical semiconductor to manipulate light digitally. When a DLP chip is coordinated with a digital video, graphic signal, a light source, and a projection lens, its mirrors can reflect an all-digital image onto any surface.

Light source agnostic:

Reinforcing the flexibility of the DLP chip, manufacturers can select any light source to pair with DLP technology. The DLP chip is light source agnostic to lamp, laser and LED light.

Award-winning, long-lasting colour accuracy:

DLP Products are the industry standard for all post production cinematic color calibration work due to the color spectrum produced by DLP technology. In February 2015, the DLP Cinema Products team received the 2014 Scientific and Engineering Award (Academy® Plaque) for color accuracy of DLP Cinema projectors.

No limits on resolution:

There are no technical limitations to the achievable resolution from a DLP chip. The technology can scale to 4K resolution when needed in the biggest, brightest display down to HD resolution in miniature display put inside mobile devices. DLP technology will scale to any data resolution as content demands it.

Unparalleled switching speed allows built-in intelligence

The DLP chip has an unparalleled 16 microsecond response time, giving users precise, razor-sharp images. Picture millions of tiny mirrors flipping on and off at speeds faster than light. This incredible switching speed allows DLP technology to produce a highly precise, crystal-clear image with no delay between frames.

 Movies, games, and fast-paced educational content are experienced in crisp, vivid detail regardless of the speed of action.

Low power consumption

Texas Instruments is a leader in research and development. DLP Products continues to innovate on increasing display brightness

decreasing while dramatically decreasing packaging size and required power. DLP® Pico™ has hit milestones on lumens per watt which is directly proportional to allowing consumers to now have embedded projection from a cell phone.

"The flexible DLP chip is used in both traditional and non-traditional displays"

DLP technology is best known for Scientific and Technical Award-winning TI DLP Cinema® and innovations in classroom projection display such as SmartSource™ 3D and interactive projection, but the incredibly flexible technology is finding its way into a variety of non-traditional display applications as well. Developers are using the DLP chip to solve real world problems for industrial, security, medical and even automotive applications that require built in intelligence.

The Christie Mirage 5000, a 2001 DLP projector.

Self Check Exercise-1

Q-1: What do you mean by DLP?

Q-2: Discuss the use of three-chip projectors.

Q-3 DLP is a key part of cloud access security brokers (CASBs). **True/False**

Q-4 DLP products can be categorized in to which of the following two deployment models?

Q-5 Digital Processing (DLPis a display device based on …………..that uses a digital micromirror device.

6.4-Movie projector

A movie projector is a mechanical device used to display motion picture film by projecting it onto a screen. Most of the optical and mechanical components, aside from the illumination and sound systems, are similar to those found in movie cameras.

The first movie projector was the Zoopraxiscope, created by British photographer Eadweard Muybridge in 1879. This device projected images from rotating glass discs in quick succession to create the illusion of motion. Initially, the stop-motion images were hand-painted onto the glass as silhouettes. A later series of discs, made between 1892 and 1894, featured outline drawings printed onto the discs photographically, then hand-colored.

A more advanced movie projector was invented by French inventor Louis Le Prince while he was working in Leeds. In 1888, Le Prince patented a 16-lens device that combined both a motion picture camera and a projector. That same year, he filmed the first-ever motion picture, *Roundhay Garden Scene*, which was privately shown in Hunslet.

The Lumière brothers are credited with inventing the first successful movie projector. In 1894, they created their first film, *Sortie de l'usine Lumière de Lyon*, which was publicly screened at L'Eden, La Ciotat, a year later. The first commercial public screening of films took place in Paris on December 28, 1895. The Lumière Brothers' *Cinematograph* was also featured at the 1900

Paris Exhibition, where films were projected onto a massive screen measuring 16 by 21 meters (about 52.5 x 69 feet).

Advantages   and   Limitations
Projectors are sometimes referred to as "front projectors" or "two-piece projection systems," as they are typically paired with a separate screen, either mounted on a wall or hung from a ceiling. However, many users of more affordable projectors now opt to display images directly onto a white wall to avoid the cost of purchasing a separate screen.

Advantages:

Largest possible picture: Front projectors generate the biggest possible image size. You can use them to create the very large screen experience of a commercial movie theater in your own home. In theory, actual image size can go up to 300" diagonal or more. But in reality the size of any given projector's image is limited by its light output. Nevertheless, most projectors produce beautiful images at sizes of 90" to 120" diagonal, which is far larger than anything you can get with flat screen TVs or rear-projection TVs.

Smaller images a great option also: Perhaps you don't want a huge image, or maybe you don't have space for one. If this is the case, a projector can be used to throw a smaller image, say about 60" diagonal. So it can serve as an inexpensive substitute for a 60" plasma TV. At this image size the picture is usually very bright, and can be used with some of the room lights on. Given the low cost of many entry level projectors, this can be the least expensive way to get a 60" picture on your wall.

Low cost: Believe it or not, a front projector can be the least expensive alternative for big screen video in your home. Some

projectors built for dedicated home theater have now dropped below $1,000, making them much less expensive than flat screen TVs or rear-projection TVs. They can even be cheaper than a regular 36" television. Of course, projectors range in price from very cheap to very expensive depending on a variety of performance factors. But even some of the best ones are now mass market consumer products and much more affordable than they used to be. And measured on a cost per diagonal inch basis, they are clearly the least expensive video products on the market.

Space saving: A small projector that is mounted on a coffee table, a rear shelf or bookcase, or mounted on a ceiling, takes up no floor space in the room. When not operating, it is largely invisible. Using a projector gets rid of the big box television that really doesn't look very good in the room when it is not being used.

Easy to install: The ease of installation can vary actually. But if you are setting up a simple system on a coffee table or a rear bookshelf and shining it onto a white wall, it really is as easy to set up as a simple television. They are lightweight, and one person can pull it out of the box, hook it up and get a picture on the wall with little trouble. Sometimes some adjustments are required to fine tune the picture so that it looks its best, but that is true of all video products including conventional televisions.

Limitations:

Dark room often required. Front projectors look their best in a darkened room, just like a movie theater. When you view in a dark room you get maximum contrast and sparkle in the picture. Whether you need a dark room or not depends in part on how bright your projector is, and in part on how picky you are about maintaining maximum image quality. If you are trying to create the "movie theater" experience, this is not really a disadvantage since you want a dark room anyway. However, if you plan to have a lot

of family or social gatherings around your screen, a darkened room may not be desired. So your intended usage needs to be considered before selecting a front projector.

Maintenance required. Most projectors require maintenance attention that flat screen and regular televisions do not. All projectors operate on lamps that need to be replaced periodically, and lamps can cost $300 to $400, or even more in some cases. The frequency of lamp replacement depends on the model and on your usage, but many projector users replace lamps every two to three years.

In addition to lamp replacement, most projectors have air filters that need to be cleaned or replaced every couple of months. Failure to keep filters clean can reduce lamp life and increase the chances of dust getting into the unit and creating fuzzy spots on the projected image. Once this happens, a projector usually must be returned to the dealer or manufacturer for cleaning. Some projectors have sealed optics that eliminate this issue, but most do not since sealing the optics adds cost to the unit.

Installation can be more involved. As noted above, the ease of installation varies based upon how you want to set it up. If you plan to ceiling mount it, you may need to hire some help to run power and signal cables through the walls. Furthermore, if you are using a projection screen as well, then hooking a fixed screen to the wall, or installing an electric retractable screen on or in the ceiling adds further steps to the installation process. If the projector does not have physical lens shift capability, the job of ceiling mounting to fit a screen must be done with particular care. ("Lens shift" is a feature that lets you move the lens up and down.

Rainbow artifacts. In choosing a projector you should be aware that some users of projectors using DLP technology can see color separation artifacts, commonly known as rainbows, or rainbow artifacts. This is an unfortunate side-effect of the spinning color

wheel in the light engine of a DLP projector. Most people are not sensitive to this phenomenon, but those who are can experience it as anything from a minor distraction to a severe flaw that makes the projector unwatchable. In addition to being visually distracting, the effect is also reported to cause headaches and eyestrain. If you are acquiring a DLP projector for home use it is important to verify that you, your spouse, and any other regular viewers are not sensitive to DLP rainbow artifacts.

Separate audio system required. Most projectors either have no audio on board, or if they do, it is not audio you'd want to use for movie presentation. So most people who opt for a projector are also setting up a separate surround sound audio system to go with it. (Big pictures look better with big sound.) If budgeting the whole system is too much of a stretch, you can always get the projector today and use your current two-channel stereo as a good audio solution until you have the cash and time to get into the world of multi-channel surround sound.
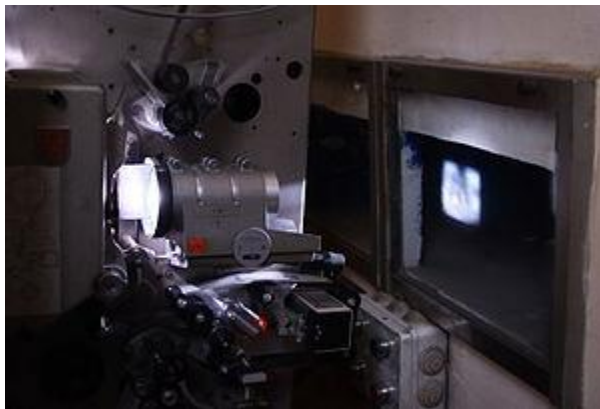
35 mm movie projector in operation

Self Check Exercise-2

Q-1: Discuss the term movie projector.

Q-2: What do you mean by the term projector?

Q-3 Which type of lenses is used in movie projectors?

a) Zoom lens

b) Meniscus lens

c) Concave lens

d) Convex lens

Q-4 Which type of lenses is used in cinema hall?

a) Zoom lens

b) Meniscus lens

c) Concave lens

d) Convex lens

6.5 Summary: A slide may be in colour or black and white. transparencies. Although the DLP imaging device was created by Texas Instruments, the first projector using DLP technology was launched by Digital Ltd in 1997. In 1998, both Digital Projection and Texas Instruments received Emmy Awards for their contributions to DLP projector technology. DLP is now used in a wide range of display applications, including traditional static displays, interactive displays, and even non-traditional embedded applications in fields like medicine, security, and industry.

The first movie projector was the Zoopraxiscope, invented by British photographer Eadweard Muybridge in 1879. The zoopraxiscope projected images from rotating glass disks in rapid succession to give the impression of motion.Front projectors generate the biggest possible image size. You can use them to create the very large screen experience of a commercial movie theater in your own home.In choosing a projector you should be aware that some users of projectors using DLP technology can see color separation artifacts, commonly known as rainbows, or rainbow artifacts.

6.6: Glossary:

Illumination: The intensity of light falling at a given place on a lighted surface

Non-traditional: Not following or conforming to traditional

Zoopraxiscope: A motion picture projector

6.7: Answers to Self-Check Exercise:

Self -Check Exercise:-1

Ans-1: It is a display device that utilizes optical micro-electro-mechanical technology and operates with a digital m.m. device.

Ans-2: ephrase,"A three-chip DLP projector uses a prism to split light from the lamp, and each primary color of light is then routed to its own DLP chip, then recombined and routed out through the lens"

Ans-3: True

Ans-4: Network based and agent base

Ans-5: Optical micro-electro-mechanical technology

Self -Check Exercise-2

Ans-1: A movie projector is a mechanical device used to display motion picture films by projecting them onto a screen. Most of the optical and mechanical components, excluding the illumination and sound systems, are similar to those found in movie cameras.

Answer 2: Projectors are often referred to as "front projectors" or "two-piece projection systems" because they are usually paired with a separate screen that is either mounted on a wall or suspended from the ceiling.

Ans-3: Convex lens

 Ans-4: Convex lens

6.8-References and suggested readings:

^ "Louis Lumière, *The Lumière Cinematograph. In:Fielding, Raymond (1979). A technological history of motion pictures and television: an anthology from the pages of the Journal of the Society of Motion Picture and Television Engineers. University of California Press. pp. 49–51. ISBN 0-520-03981-5.*"

"Overhead Projectors". National Museum of American History. Retrieved 7 January 2015.

^ http://www.life123.com/technology/home-electronics/projectors/who-invented-thoverhead-projector.shtml

6.9-Terminal Questions:

What is the use of audio-visual recording instruments in the field of education?

Write a short note on the movie projector.

What do you mean by DLP? Give its uses in education.

Unit-7

Audio-Video Recording Instruments Closed Circuit Television, Smart Classroom, Educational Satellite etc.

Structure:

7.1-Introduction

7.2-Learning Objectives

7.3- Closed-circuit television

Self-Check Exercise-1

7.4- Audio-Visual Recording Instruments

Self-Check Exercise-2

7.5 -Meaning and Concept of Smart Classroom

Self Check Exercise-3

7.6 -Educational Satellite

Self Check Exercise-4

7.7- Summary

7.8-Glossary

7.9- Answers to Self-Check Exercise

7.10- References and suggested readings

7.11- Terminal Questions

7.1-Introduction:

The communication strategy, teaching strategies and tactics are selected for achieving objectives and generating learning structures. The audio-visual teaching aids also play a significant role for this purpose. Audio-video recording instruments like tape recorder (VCR) and VCD play a very important role in classroom situations. Let's explore their nature and functionality as follows. The use of CCTV for public surveillance is widespread in many parts of the world. Recently, body-worn video cameras have emerged as a new form of surveillance. The auditory sense is enhanced through the use of teaching aids. Classroom films on specific curricular subjects are produced to support and enhance learning in those areas.

. A slide projector is a specialized projector which has been designed to be used with slides. Slides are small transparencies mounted in sturdy frames which are ideally suited to magnification and projection, since they have a very high resolution and a resulting high image quality. The use of slide projectors has decreased as alternative projection methods have become more popular. Today, film projectors are considered outdated, with high-resolution digital projectors offering numerous advantages over traditional film units. Digital projectors, for instance, have no moving parts except for fans, can be operated remotely, and are relatively compact. They also make content storage and distribution easier, cheaper, and more reliable, and can even display live broadcasts. Recently, CCTV technology has evolved with a shift toward internet-based products and systems, along with other technological advancements. Audio-visual communication is an effective approach for sharing data or information. Audio-visual devices are highly effective because they combine both audio and visual elements to convey high-quality, easy-to-understand information. A recording instrument, which is an electrical measuring device, tracks and records continuous changes in an electrical quantity over a specific period. The use of devices like tape recorders, radios, record

players, and gramophones helps engage learners and makes the teaching process more interactive and effective.

7.2-Learning Objectives: After reading this chapter, the students will be able to know about:

Closed-circuit television

Use of audio-visual recording instruments in the field of education

Meaning, concept and characteristics of education.

Meaning and Concept of Smart Classroom

Educational Satellite

7.3 - Closed-circuit television:

Closed-circuit television (CCTV), also referred to as video surveillance, involves the use of video cameras to transmit signals to specific locations, usually on a limited number of monitors. Unlike broadcast television, the signal is not transmitted publicly, although it can utilize point-to-point (P2P), point-to-multipoint (P2MP), or mesh wireless connections. While any video camera technically fits this description, the term is most commonly applied to those used for surveillance in areas requiring monitoring, such as banks, casinos, airports, military installations, and convenience stores. Video telephony is rarely referred to as "CCTV," but the use of video in distance education is often associated with the term.

In industrial settings, CCTV systems are used to monitor parts of a process from a central control room, particularly in environments where human presence is not feasible. CCTV

systems can operate continuously or be activated only when a specific event needs monitoring. An advanced form of CCTV, utilizing digital video recorders (DVRs), allows for long-term recording with various quality settings and additional features such as motion detection and email alerts. More recently, decentralized IP cameras, some with megapixel sensors, have enabled recording directly to network-attached storage devices or internal flash memory for stand-alone operation. The use of CCTV for public surveillance is widespread in many regions globally, and in recent years, body-worn video cameras have emerged as a new form of surveillance.

Role of CCTV in Education:

The school bell rings and children rush outside eagerly, pushing to get through to the long-awaited freedom that each end of the day guarantees. Scattered papers and pencils are now the only things that clutter the hallways at each day's end. Teachers and school staff hastily complete their lesson plans for the next day, also wanting to get home to their own families and lives. Meanwhile, burglars nearby examine the school for any way to gain entrance undetected. Grant-funded computers and technology are at risk of being stolen, as teachers and staff is unable to incessantly guard the buildings of education around the clock.

The Department of Education published statistics stating that in the 2005-2006 school year, 86 percent of schools nationwide had reported at least one theft, crime, or violent incident, which resulted in a total of 2.2 million crimes. It is impossible to personally monitor every inch of school grounds every single day, so how are school campuses and educational facilities meant to keep their students and staff safe and harbor a sense of security? This is where closed-circuit television, or CCTV, can put up the

next line of defense, scanning the perimeters and potentially acting as a deterrent to any future types of criminal activity.

CCTV can serve a variety of functions in the educational sector. Primarily, it provides security for educational buildings by protecting the premises and technology from external threats, such as individuals intending to harm students, steal expensive equipment, or vandalize property. It also safeguards against internal threats by helping to confirm or disprove claims of incidents like sexual abuse, bullying among students, or theft involving teachers or staff. In addition, CCTV has recently been utilized as an educational tool, facilitating distance learning for remote areas or non-traditional learners.

Security cameras have also been used to stop or prevent bullying in schools as well. Bullying has been shown to be very detrimental to a child's health and social well being, so it is crucial to identify and address the perpetrators before victims retaliate or bullies go too far. Installing security cameras would allow for constant monitoring of areas where bullying is suspected to be occurring, and could also possibly discourage any future bullying behaviors. One school in the United States found that once security cameras were installed, the bullying and harassment stopped. Although bullying may still take place outside of school and away from the camera's monitor, security cameras can potentially eliminate bullying on school campuses, which is a slow, but sure step in the right direction.

It can also be used as an educational tool to stream learning sessions to remote areas from universities or other educational facilities. There are many people who are unable to attend a traditional classroom setting for many reasons, and this is where CCTV may be used to act as an in-home or off location education setting. Distance education is continuously growing, and is now the most cost effective education that can be offered to a majority of people. CCTV has many advantages in terms of using it for distance education, such as its quality, control of content, and immediate replay options.

As the world becomes ever more intertwined in technology, CCTV will continue to serve roles in educational facilities by providing security measures against criminal activity and theft, bullying, and vandalism. CCTV in distance learning will continue to grow even more, as more and more countries become developed and are able to access Internet connections more easily. As technology advances, CCTV will perhaps be utilized in even more aspects in order to provide cutting-edge education and assist educators in the learning process of students all through the world.

Self Check Exercise:-1

Q-1: Discuss the term "closed circuit television".

Q-2: In which country was the first CCTV system introduced?

    a) India

    b) China

    c) Germany

    d) USA

Q-3 What is the full form of CCTV?

    a) Closed circuit television

    b) Circuit capacitor television

    c) Community circuit television

d) Closed capacitor Telephone

7.4- Audio-Visual Recording Instruments

The communication strategy, teaching strategies and tactics are selected for achieving objectives and generating learning structures. The audio-visual teaching aids also play a significant role for this purpose. Audio-video recording instruments like tape recorder (VCR) and VCD play a very important role in classroom situations. Let us discuss their nature and working as under:

(1) **Tape Recorder**:

Tape recorder is a useful auditory aid at the service of the teacher. It is an effective recording instrument that can be successfully used for teaching. It calls for the use of auditory senses to convey the educational message to learners. It is an instrument which is used for recording speeches, songs, music and these can be played back at any time and number of times. Recitations, discussions, poems, and dialogues of teachers and students can be recorded and used according to requirements. Students can hear their voices with pleasure and definitely with a sense of pride and elation. Records of gramophone can become useless and unserviceable after some time but tape can be made use of time and again. If some piece or selection is not needed, it can be erased and tape may be used for recording and erasing can go on for a considerable time, till the tape is worm out.

Educational uses of Tape-Recorder:

Educational Uses of Tape Recorder: The importance of Tape-Recorder in education are discussed as below:

1. Recording Educational Broadcasts: Tape-Recorder can be used to record educational broadcasts and for replay at suitable and convenient time. Recordings can be stopped at will to discuss

passages to answer questions and to clarify certain points. Recordings can be made to play over and over again. Thus recordings are two way communications.

2. Recording assembly programmes: Tape-Recorder can be used to record school assembly programmes including talks of important visitors, students, administrators, and programmes like panel discussion, drama, music etc.

3. Speech Training: Tape-recorder can widely used in language laboratories for giving speech training and for correction of pronunciation defects. Recording of model talks by teachers or experts in the languages can be frequently used. Student's talks can also be recorded and played. The mistakes may be pointed out during replay.

4. Learning of Music: A tape recorder can be used to learn instrumental and vocal music. Students can record their performances and later review them with their teacher to identify areas for improvement.

5. Learning of dramatics: Tape-Recorder can be very useful in learning of dramatics. It can be proved useful for recording rehearsals of schools dramatizations that are to be presented on the radio or school stage for the public .This will help in improving the programmes.

6. Organization and evaluation of co-curricular activities. Tape-recorder may help in the organization, conduct and evaluation of various co-curricular activities of the institution.

7. Improvement of performance: Tape-recorder can effect an improvement of the performance of those learners who are retarded in any field. **8. Useful in Micro-Teaching:** In teacher

training institutions a tape recorder can be effectively used during the micro-teaching session. The tape recorder is the necessary feedback for discussions to improve the lesson.

Video-Recording:

A digital video-recorder (DVR) or personal video-recorder (PVR) is a device that records video in a digital format to a disk drive or other medium. The term includes stand alone set-top boxes and software for personal computers which enables video capture and playback to and from disc. Some consumer electronics manufacturers have started to offer televisions with DVR hardware and software built in to the television itself. It has also become the main way for CCTV companies to record their surveillance, as it provides far longer recording times than the previously used VCRs.

Educational Advantages of VCR and VCD:

Experiences of reality:
VCR and VCD provide us both auditory and visual experiences of reality. These experiences can be utilized in the classroom or with any group audience according to our experience.

Useful in teaching:
The recorder experiences of the VCR and VCD can be utilized for teaching almost all the school subjects including the provision of learning skills regarding the organizations of co-curricular activities.

Feedback to students:
The recorder events of the video-camera, VCR or VCD can be used for providing proper feedback to the students in the

task of audio instruction or organized classroom teaching – learning experience after observing or evaluating their performances in their real work situations or discussions.

Feedback to student teachers:

Video cassette or CD recording or video film can be utilized In providing feedback to the student teachers during their micro-teaching or full dressed rehearsal in actual classroom teaching for improving their teaching skills and teacher behavior.

Training in curricular and co-curricular areas:

We can utilized the recorded experiences for arranging a systematic , methodical and enriched procedure for providing training to the students in various curricular and co-curricular areas requiring special skills like laboratory skills , writing and sketching skills, geometrical skills and mathematical skills of surveying ,estimating proportionately dividing, computing, map ,drawing , graphical representation, making of models, art and craft material, dancing, gaming proficiency in drill activities, sports and games.

Self Check Exercise:-2

Q-1: Discuss one use of Tape Recorder in education.

Q-2: Discuss DVR

Q-3: What is the full form of CATV?

a) Community Antenna Television

b) Closed Antenna Telephone

c) Circuit Antenna Television

d) Circuit access Telephone

Q-4 A digital video-recorder (DVR) or personal video-recorder (PVR) is a device that records video in a digital format to a disk drive or other medium. **True/False**

Q-5 Tape recorder is a useful …….at the service of the teacher.

7.5 -Meaning and Concept of Smart Classroom

Smart classrooms combine technology at the teacher's desk, technology in the hands of students, and a physical environment designed to support the effective use of that technology. Research indicates that modest academic improvements can result from integrating technology into classrooms. Beyond academic progress, technology also offers the chance to engage students more fully, expose them to tools used in the workplace, and provide immediate feedback on classroom learning.

Smart classrooms incorporate interactive elements like videos and presentations, which appeal to students who may struggle with traditional teaching methods. In fact, they can be almost like watching movies, with animated visuals used to teach concepts. These visuals are not only eye-catching but also relatable for younger students. By engaging both the visual and auditory senses, this approach helps students absorb information more quickly and effectively. Additionally, much of the time previously spent preparing diagrams or drawings on the board is saved, as smart boards can store and display all necessary information during lectures.

Another advantage is that smart boards eliminate the issues some students and teachers face with chalk dust, preventing potential allergic reactions or health concerns. They also offer opportunities for virtual field trips that textbooks cannot provide, such as exploring the Sahara Desert or the Amazon Rainforest, which is far more engaging than reading about them in a textbook.

1. Improving classroom management

SMART Board uses in the classroom at the elementary level increasingly are including management start-of-day routines such as taking attendance and lunch count.

For example, before class every day, a first grade teacher may post large, colorful icons marked with individual student names. The board may also show pictures of the day's lunch choices. Then, instead of waiting for roll call and lunch count or checking in on a magnet board or pocket chart, the students use their fingers to guide their icons to their lunch choices. The teacher views the class and the board to see if the record keeping is complete. Then she can report the attendance and lunch counts.

This process also helps young students become comfortable with the touch process that is becoming so important in using Wi-Fi digital tools, such as the computer notepads and e-readers that some schools are adopting for instructional use.

2. Minimizing the need for eyes at the back of the head

Teachers often jokingly say that it takes a few years to develop "eyes" at the back of their heads so they can detect misbehavior when facing away from students. SMART Boards change classroom management by minimizing the amount of time teachers need to turn their back to the class to write on dry-erase whiteboards or chalkboards.

By connecting a computer to a SMART Board, a teacher can stand face forward and attract student attention to a particular topic by sharing PowerPoint presentations, software lessons or interactive websites with the entire class at one sitting. This occurs before students begin small group or independent work on the same topic.

3. Providing academic & digital learning

During SMART Board lessons, teachers may also help students gain digital and presentation skills by taking turns manipulating the equipment. Think of this practice as the Digital Age equivalent of going up to the blackboard to solve a problem.

SMART Board uses in the classroom may include teaching various lessons. Examples include:

- Fourth grade fractions made more comprehensible by viewing the movement of virtual tools, such as pictures of cubes, pie graphs and other objects.
- Civil War history for middle school students, who enrich textbook learning by taking a fictional tour of the Underground Railroad in which the class makes choices and sees where those decisions lead.
- Virtual dissection of a frog in high school biology.

4. Building motion into kindergarten lessons

Young children have short attention spans and respond better to instruction if it includes movement and hands-on action, such as getting up to answer a question or demonstrating how to use a tool. As one kid-favorite song says, they "like to move it, move it."

The Australian journal Teaching Science notes that kindergarten students enjoy touching SMART Boards to answer questions and participate in lessons. They also respond well to the colorful graphics that are much easier for a large group to view on a large screen.

Using electronic pens to circle items or moving virtual objects with their fingers, kindergarten students can sort items on a SMART Board to show what they know about a particular subject. For

example, they might be asked to separate objects that need electricity from those that don't.

5. ☐ Smart classroom learning enhances students' learning abilities.

☐ Smart classrooms can be used as an experimental learning tool for teaching students.

☐ The curriculum should be designed with the integration of smart classroom teaching methods in mind.

☐ This approach allows learners to progress at their own pace, providing individualized instruction.

☐ While students often collaborate in small groups during hands-on science lessons, there are times when full-class discussions are crucial. Activities like experimentation, summarizing, comparing, observing, and interpreting often require the involvement of the entire class. Teachers can use both small group and whole-class teaching strategies, deciding which is most suitable for each situation.

Self Check Exercise-3

Q-1: What do you mean by the term smart classroom?

Q-2 Which of the following arrangements is an effective supplement for providing teacher -education through distance mode?

     a) EDUSAT

     b) Smart Classroom,

     c) Virtual Universities

     d) MOOC

Q-3 learning through Smart class room help to ……. the learning abilities

7.6 -Educational Satellite : Considering the potential benefits of INSAT in educational programs, the Ministry of Human Resource Development (MHRD) envisioned the EDUSAT project in October 2002. The satellite was launched on September 20, 2004. EDUSAT is the first Indian satellite designed specifically for the educational sector, providing an interactive, satellite-based distance education system for the country. It is specially configured for the audiovisual medium, using digital interactive classrooms and multimedia systems across multiple centers.

On the 21st September; the" Indian Space Research Organization (ISRO)" successfully launched a rocket in to space carrying a 1950 kg satellite dedicated to the cause of education, 'EDUSAT'. The rocket was launched from the country's only spaceport at Sriharikota and placed its payload on a designated orbit, 5000 km away minutes later.

EDUSAT is expected to have a life of seven years in space, during which it will help educational institutions make up for, among other things, the dearth of good teachers by providing connectivity with classrooms far away.

The universalisation of education has become the top priority in India, especially for the developing countries.

But the extension of quality education to remote and rural regions becomes a Herculean task for a large country like India with multi-lingual and multi-cultural population separated by vast geographical distances.

Self-Check exercise-4

Q-1 Which was the first "satellite for education" launched by ISRO?

a) Apple

b) Chandrayaan

c) Sputnik 1

d) Edusat

e) Aryabhata

Q-2 CIET is a unit of which of the following organizations?

a) SIET

b) SCERT

c) NCERT

d) EMMRC

7.7-Summary:

A slide is a photographic transparency that can be projected onto a screen. It is made from a transparent material, such as cellulose acetate film, translucent paper, or glass, and contains images or drawings. Slides are typically mounted individually for use in a projector or for viewing with transmitted light. They can be either in color or black and white. There are various types of glass slides, including photographic, etched glass, and ink slides. Slides are often used for educational purposes.

In overhead projection, a transparent visual is placed on a horizontal stage above the light source. The light passes through the transparency and is reflected at a 90-degree angle onto the screen behind the speaker. Overhead projectors typically include a projection lamp as the light source, condensing lenses to focus the light into a beam, a polished mirror and lens assembly, and a blower to cool the system.

While motion pictures may not always provide as effective a teaching tool as direct experiences, they can sometimes offer a better learning outcome than even firsthand experiences. This medium is commonly used to display still visual materials through projection. It is a simple device that does not require specialized training to operate. The overall use of an overhead projector can be divided into two categories: the structure and operation of the device, and the preparation and use of the transparencies.

7.8-Glossary:

Standalone:
Able to operate without any other machinery or programs

Considerable: large in extent or degree.

Interactive Media: a method of communication in which a program's outputs depend on the user's inputs.

Surveillance: The careful watching of somebody especially byan organization such as the police or the army

Proportionately: In a way that keeps the same relationship between numbers or amounts

Dramatizations: The reconstruction of an event ,novel,story,etc.in a form suitable for dramatic presentation

7.9-Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: Closed-circuit television (CCTV), also known as video surveillance, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors.

Ans-2 Germany

Ans- 3 Closed circuit television

Self-Check Exercise-2

Ans-1: Tape-Recorder can be used to record educational broadcasts and for replay at suitable and convenient time. Recordings can be stopped at will to discuss passages to answer questions and to clarify certain points. Recordings can be made to play over and over again. Thus, recordings are two-way communications.

Ans-2: A digital video-recorder (DVR) or personal video-recorder (PVR) is a device that records video in a digital format to a disk drive or other medium. The term includes standalone set-top boxes and software for personal computers which enables video capture and playback to and from disc.

Ans-3: Community Antenna Television

Ans-4 True

Ans-5 Auditory aid

Self-Check Exercise-3

Ans-1: Smart classrooms integrate technology both at the teacher's desk and throughout the classroom, placing technology in the hands of students and creating a physical environment that supports the effective use of that technology.

Ans-2 MOOC

Ans-3 Increase

Self-Check Exercise-4

Ans-1: Aryabhata

Ans-2: NCERT

7.10-References and suggested readings:

- "How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.

- Texas Instruments "DLP3010 Mobile HD Video and Data Display Description & parametrics" Retrieved 2014-10-13

- Louis Lumiere, The Lumiere Cinematograph. In: Fielding. Raymond (1979) A technological history of motion pictures and television: an anthology from the pages of the Journal of the Society of Motion Picture and Television Engineers. University of California Press, pp. 49-51. ISBN 0-520-03981-5.

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7.11-Terminal Questions:

- Discuss in detail the role of CCTV in the upliftment of educational system.

  Discuss the characteristics of CCTV.

- Discuss the Educational Advantages of VCR and VC

Chapter-8

Digital library, Web Site, 2.0 web technology, Meaning and Nature of open education Resources

Structure:

8.1-Introduction

8.2-Learning Objectives

8.3- Digital library

   Self-Check Exercise-1

8.4- Advantages of Digital Library

   Self-Check Exercise-2

8.5- Web site

   Self-Check Exercise-3

8.6- Advantages of Websites in educational field

   Self-Check Exercise-4

8.7-2.0 web technology

   Self-Check Exercise-5

8.8- Advantages of 2.0 web technology in education

   Self-Check Exercise-6

8.9- Meaning and Nature of open education Resources

   Self Check Exercise-7

8.10- Advantages and disadvantages of open educational Resources

Self Check Exercise-8

8.11- Disadvantages of OER

Self-Check Exercise-9

8.12- Summary

8.13- Glossary

8.14- Answers to Self- Check exercise

8.15- References and Suggested Readings

8.16- Terminal Questions:

8.1-Introduction:

An electronic library serves as an information retrieval system, and websites may be accessed through public networks like the Internet or private local area networks (LAN), identified by a uniform resource locator (URL). Web 2.0 refers to websites that focus on user-generated content, enhanced usability, and interoperability for end users. Content can either be "born-digital," created in digital format, or digitized from physical mediums, like paper. Not all electronic content is in digital data format.

Websites serve various functions and can be personal, commercial, government-related, or non-profit. These sites include teaching, learning, and research resources available in the public domain or released under licenses that allow free use and adaptation. A website is a collection of web pages accessed through a single domain name (URL), containing various multimedia and files hosted on a web server. Websites are

typically created using HTML, CSS, and JavaScript to ensure a visually appealing and functional layout. They often focus on specific topics such as news, education, commerce, or social media.

Today, an increasing number of institutions and individuals share digital resources online, providing free and open access to knowledge. Open Educational Resources (OER) are key to this movement, offering free and accessible education to everyone. OER fosters a culture of collaboration and sharing, contributing to the development of a knowledge society. These resources include full courses, textbooks, streaming videos, software, and any materials that aid in knowledge accessibility. An electronic library functions as an information retrieval system, and OER enables the free use and adaptation of educational materials.

In higher education, resources that were once considered intellectual property are now shared openly, reflecting a shift toward inclusivity and equity in today's connected world. The Wiki Educator project emphasizes that OER encompasses educational resources such as lesson plans, quizzes, and instructional modules that are freely available for use, reuse, and adaptation. Although OER supports various educational purposes, most organizations offering OER do not provide academic credits or formal support for students seeking degrees from accredited institutions.

8.2-Learning Objectives: After reading this chapter, the learners will   know about:

Concept and advantages of Digital library

The use of Web site in educational process

Meaning and concept of 2.0 web technology

Meaning and Nature of open education resources with its advantages and disadvantages.

8.3 Digital Library:

A digital library is a specialized library that houses a curated collection of digital materials such as text, images, audio, and video, all stored in electronic formats. These digital resources are organized, stored, and retrieved using specific systems, which allow users to access them easily. Digital libraries can vary significantly in size and scope, and can be maintained by individuals, organizations, or associated with established physical library institutions or academic entities. There is often a distinction made between content that was originally created in a digital format, called "born-digital," and information converted from physical media, such as paper, through digitization. Additionally, not all electronic content is in digital data formats. Many academic libraries contribute by building institutional repositories that house books, papers, theses, and other works, which may either be digitized or were created digitally. A core feature of digital archives is their preservation of the context in which records were created and their relationships, which ensures that the information remains accessible and meaningful over time.

Most digital libraries provide search interfaces that enable users to locate resources, and they often host deep web or invisible web resources, which are not indexed by traditional search engines. To improve discoverability, some digital libraries create special pages or sitemaps for search engines. Advances in digitizing books at high speeds and low costs have made it possible to digitize millions of books each year, with initiatives like Google's

book-scanning project contributing to the expansion of digital collections.

Advantages of Digital Libraries:

The widespread recognition of the benefits of digital libraries—particularly their ability to facilitate quick access to books, archives, and images—has been acknowledged by both commercial interests and public institutions. Traditional libraries face storage limitations, but digital libraries can store vast amounts of information since digital formats require little physical space. As a result, maintaining a digital library is often more affordable than managing a traditional one, which incurs costs related to staff, book maintenance, and physical space. Digital libraries may reduce or even eliminate many of these costs.

Digital libraries also offer increased accessibility, allowing people from anywhere in the world to access information as long as they have an internet connection. Unlike physical libraries, digital libraries are available 24/7, ensuring users can access materials at any time. They also support simultaneous access by multiple users, whereas physical libraries may limit access to a single copy of copyrighted materials at a time.

The ability to search through vast digital collections using any term (word, phrase, title, name, or subject) enhances the user experience, and many digital libraries offer easy-to-use, click-through interfaces. Digitization also plays a role in preservation, providing access to fragile materials that might otherwise degrade due to repeated handling. While digitization is not a long-term preservation solution, it does protect collections and makes them accessible to a wider audience.

Digital libraries require minimal physical space and can store significantly more information than traditional libraries. This makes digital storage more cost-effective, as media storage technologies

are now more affordable than ever. Additionally, digitization can enhance the quality of images, improving legibility and removing visible flaws like stains or discoloration.

Website:

A website, often written as "web site," is a collection of interconnected web pages, which may include multimedia content. These pages are typically identified by a shared domain name and hosted on at least one web server. Websites can be accessed via public internet protocols (such as the Internet) or private local area networks (LANs) by referencing a uniform resource locator (URL) that identifies the site. Websites collectively form the World Wide Web, while private websites are typically part of an intranet.

The building blocks of websites are web pages, which are usually composed of plain text mixed with HTML (Hypertext Markup Language) code that provides structure and formatting. Web pages may also contain elements from other websites, linked with appropriate markup. Web pages are accessed and delivered through the Hypertext Transfer Protocol (HTTP), and sometimes encrypted with HTTPS for added security and privacy.

Websites can serve a variety of purposes, including personal, commercial, governmental, or non-profit uses. They are typically focused on a particular topic, and their content can be created by individuals, businesses, or organizations. Websites can also feature hyperlinks that lead to other sites, blurring the distinction between individual sites as perceived by users.

A website is hosted on a computer system called a web server, which retrieves and delivers web pages in response to user

requests. The software running on these servers is also referred to as the HTTP server.

Self Check Exercise-3

Q-1: Discuss Website.

8.6- Advantages of Websites in the field of education:

Improving Communication Between Students and Faculty:

Web-based education tools offer various methods to enhance communication between students and faculty, including discussion boards, chats, and emails. Studies have shown that incorporating these tools into a course boosts student motivation and encourages active participation in class discussions and projects.

Students Share Different Perspectives:

Online forums, such as Course Info's Discussion Board and Chat, create spaces for students to share information publicly. Each student can view others' responses and benefit from exposure to diverse perspectives. This interaction allows students to combine their own opinions with those of others, fostering a stronger foundation for learning.

Promoting Equality Among Students:

Web-based communication tools also help ensure all students feel equal in the classroom. By enabling everyone to post messages online, students can contribute without the typical barriers of seating arrangements, voice volume, or gender biases.

Shy or anxious students often feel more comfortable expressing their ideas in written form rather than speaking in front of a class. Research shows that online discussions can lead to more direct and open communication between students.

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Catering to Diverse Learning Styles:

Instructors can present materials in multiple formats to cater to different learning styles. For example, posting both lecture notes and slides online benefits both visual and auditory learners. Students who prefer to listen and watch during lectures can concentrate on understanding the material without worrying about missing important points while taking notes. Students with attention difficulties or those who struggle with organizational tasks also benefit, as the provided materials are well-structured, indicating key items and their relevance.

Encouraging Exploration:

Instructors can foster student exploration and active learning by including related websites in the Course Info's External Links feature. By referencing these external resources, instructors reinforce course content and provide students with insights into how the material is applied in real-world scenarios.

Allowing for Additional Rehearsal Time:

For students who learn best by doing, web-based discussions provide extra opportunities for information rehearsal. While students typically rehearse content during study sessions or assignments, online discussions offer another chance to engage with the material by typing out their thoughts and formulating ideas into written form. This additional time spent on the material helps reinforce learning.

Q-1: Write one advantage of website in education.

8.7 - 2.0 web technology:

A second generation in the development of the World Wide Web, conceived as a combination of concepts, trends, and technologies that focus on user collaboration, sharing of user-generated content, and social networking. The term "Web 2.0" was popularized by Tim O'Reilly and Dale Dougherty during the O'Reilly Media Web 2.0 Conference in late 2004, though it was originally coined by Darcy DiNucci in 1999. Web 2.0 does not represent an update to any technical specification, but rather signifies a shift in how web pages are created and used.

A Web 2.0 site allows users to engage and collaborate with one another in a social media environment, acting as creators of user-generated content within a virtual community. This contrasts with the earlier Web 1.0 sites, where users were mostly limited to passively viewing content. Examples of Web 2.0 include social networking platforms, blogs, wikis, video-sharing sites, hosted services, web applications, and collaborative consumption platforms.

With the rise of Web 2.0, it became increasingly common for average users to have social networking profiles on sites like Myspace and Facebook, as well as personal blogs hosted on affordable web hosting services or dedicated blog platforms like Blogger or LiveJournal. The content on these sites was dynamically generated from stored data, allowing readers to

directly comment on pages, a feature that was not common in the past.

Web 2.0 also opened up opportunities for more collaborative learning. For instance, blogs provided students with a public space to interact with each other and engage with class material. Some studies suggest that Web 2.0 could improve the public's understanding of science, potentially leading to better policy decisions. A 2012 study from the University of Wisconsin-Madison found that "the internet could be a crucial tool in increasing the general public's level of science literacy. This improvement could lead to better communication between researchers and the public, more substantive discussions, and more informed policy decisions."

Self Check Exercise-5

Q-1 Write a short note on 2.0 web technology.

8.8- Advantages of 2.0 web technology in education:

There are many benefits of using technology in the classroom, especially as students become increasingly digitally literate. The shift in worldwide computer usage and the need for computer skills in today's workforce have pushed the United States government to create guidelines, such as the Core Curriculum Content Standards, for educators to ensure that students are prepared to meet the demands of the 21st century. Technology in the classroom enables the use of more interactive educational tools, which allows for a dynamic learning experience that directly benefits students. Web 2.0 interaction involves not only sharing ideas and information with someone else but also receiving feedback. As classroom computer technology is being used for

different types of communication (for presentation, for class interaction, and for collaboration), students are required to be readers, writers, editors, and publishers and must be willing to collaborate and co-create closely with others -- all skills that are critical for students to learn as they grow and enter the workplace.

Another advantage of using technology in the classroom is its flexibility and adaptability to differentiated learning. Technologies such as podcasts and vodcasts, for instance, provide students with the opportunity to learn at their own pace and the freedom to go back and relearn content whenever they want. The increasing focus on technology use in schools and the shifts in ways that modern-day learners communicate have impacted how computers are used in the classroom.

Criticism of 2.0 web technology:

Critics argue that the term "Web 2.0" does not actually represent a new version of the World Wide Web, but simply continues to use existing "Web 1.0" technologies and concepts. For example, techniques like Ajax don't replace foundational protocols such as HTTP; instead, they add an extra layer of abstraction on top. Furthermore, many of the concepts associated with Web 2.0 were already present in networked systems before the term was coined. For instance, Amazon.com has allowed users to write reviews and create consumer guides since its inception in 1995, effectively engaging in self-publishing. Additionally, Amazon opened its API to external developers in 2002. These earlier innovations also stemmed from research in computer-supported collaborative learning, computer-supported cooperative work (CSCW), and established products like Lotus Notes and Lotus Domino, all of which preceded the Web 2.0 movement.

Self-Check exercise-6

Q-1 Who propound the theory of disruptive technologies in the year 2000?

    a) Clayton Christensen

    b) Elon mask

    c) John Fallon

    d) None of the above

Q-2 A website is hosted on a computer system known as a web server, also called an HTTP server. **True/False**

8.9 Meaning and Nature of Open Education Resources:

In the competitive world of higher education, educational resources were once seen as valuable intellectual property, with access restricted to privileged groups such as specific students and professors. This practice, however, is no longer acceptable in today's interconnected society. Increasingly, institutions and individuals are sharing digital resources online, removing legal, financial, and technical barriers.

"Teaching, learning, and research resources that are either in the public domain or released under an intellectual property license permitting free use and repurposing. These include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any tools, materials, or techniques supporting access to knowledge."

These definitions reveal some tensions in the understanding of OER:

- **Nature of the resource**: Some definitions restrict OER to digital resources, while others include any resource that can be used for educational purposes.
- **Source of the resource**: Some definitions focus on resources created with an educational aim, while others broaden the scope to include any resource that could be used for learning.
- **Level of openness**: Most definitions require resources to be placed in the public domain, while others limit their use to educational purposes or exclude commercial use.

Despite these differences, all definitions share several common elements:

- They allow for the use, reuse, repurposing, and modification of resources.
- They ensure free access for educational purposes for teachers and learners.
- They include all types of digital media.

Self Check Exercise-7
Q-1: What do you mean by OER?

8.10 – Advantages and Disadvantages of Open Educational Resources

Advantages of OERS:

1. Flexibility for instructors to draw from multiple resources to support course learning without requiring students to spend money on multiple books. 2. Infinite opportunities for collaboration among OER developers. 3. Promises to make higher education more accessible to people from all around the globe. 4. Web-based resources can be "living textbooks that are constantly updated with new

information and technology developments. 5. Save students on textbook costs.

Self Check Exercise-8

Q-1: Write two advantages of O.E.R.

8.11- Disadvantages of OER:

- Inconsistent quality control.

- Inconsistent availability across disciplines and/or across specific content areas within disciplines.

- Reliance on web-based resources presents potential problems with unequal access for students who do not have broadband internet connections. This could be solved with 24-hour computer labs on campus!

- Unrealistic expectations from administrators as to the extra time it takes for faculty to incorporate OER into their courses. To some degree this is can be just a cost-shifting exercise where the money the students save is due to uncompensated extra time put in by faculty.

- Uncertainty in ongoing maintenance of web-based resources.

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Self-Check Exercise-9

Q1 ………is the characteristics of online library.

a) Lower maintenance cost

b) Maximum physical space for storage

c) Less fees

d) Easiness in reading

Q2 Web-based resources can be "living textbooks that are constantly updated with new information and technology developments. **True/False**

 Q3 Uncertainty in ongoing maintenance of web-based resources is one of the limitations of OER. **True/False**

 Q4 The term OER firstly coined at ……. 2002 Forum on Open Courseware.

8.12:- Summary: "Library -- from the Latin liber, meaning "book." In Greek and the Romance languages, the corresponding term is bibliotheca. A collection or group of collections of books and/or other print or non-print materials organized and maintained for use (reading, consultation, study, research. Library system means two or more public libraries cooperating in a system approved by the commission to improve library service and to make their resources accessible to all residents of the area the libraries serve. By providing free access to educational, news, and historical resources, libraries help keep the public informed with facts, rather than confused with fiction. They act as a hub of information, and their leaders, the librarians, torch bearers for facts. A site can display the current state of a dialogue between users, monitor a changing situation, or provide information in some way personalized to the requirements of the individual user instead of merely reading a Web 2.0 site, a user is invited to contribute to the site's content by commenting on published articles or creating a user account or profile on the site, which may enable increased participation. EDUSAT is primarily meant for providing connectivity to school, college and higher levels of education and also to support non-formal education including developmental communication. A site can display the current state of a dialogue between users, monitor a changing situation, or provide information in some way personalized to the

requirements of the individual user instead of merely reading a Web 2.0 site, a user is invited to contribute to the site's content by commenting on published articles or creating a user account or profile on the site, which may enable increased participation.

8.13-Glossary

Organization: A group of people who form a business, club etc. together in order to achieve a particular aim

Typically- In a way that shows   the usual qualities of a particular person, type or thing

Abstraction: The process of taking away or removing characteristics from something in order to reduce it to a set of essential characteristics

Electronic library: An electronic library is a type of information retrieval system.

Inconsistent: Not the same as something else

Unrealistic: Not showing or accepting things as they are

Interoperability: the degree to which a software system, devices, applications or other entity can connect and communicate with other entities in a coordinated manner without effort from the end

Specification: A clear, detailed plan or description of how something will be made*.*

8.14: Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: A digital library is a specialized library that houses a curated collection of digital materials, which may include text, images, audio, and video content, stored in electronic formats (in contrast to physical formats like print or microform). It also provides systems for organizing, storing, and retrieving the files and media within its collection.

Self-Check Exercise-2

Ans-1: Users of a digital library do not need to visit the library in person; individuals from anywhere in the world can access the same information, provided they have an internet connection.

Ans-2: David W. Lewis

Self-Check Exercise-3

Ans-1: A website, also written as web site, is a collection of related web pages, including multimedia content, typically identified with a common domain name, and published on at least one web server. A web site may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site.

Self-Check Exercise-4

Ans-1: *Informative Platform for Educational* Institutes. A website is a platform where anyone can have access.

Self-Check Exercise-5

Ans-1: Web 2.0 refers to websites on the World Wide Web that focus on user-generated content, enhanced usability, and improved interoperability for users. The term was popularized by

Tim O'Reilly and Dale Dougherty at the O'Reilly Media Web 2.0 Conference in late 2004, although it was originally coined by Darcy DiNucci in 1999. Web 2.0 does not represent an update to any technical specification, but rather describes shifts in how web pages are created and utilized.

Self-Check Exercise-6

Ans-1: Clayton Christensen

Ans-2: True

Self-Check Exercise-7

Ans-1: Open Educational Resources (OER) are the right way which enables free and accessible education to everyone and access to knowledge as public good. OER cherish the culture of participation, collaboration and sharing and with an open access to scientific information it brings a notable contribution in knowledge society development.

Self-Check Exercise-8

Ans-1: Flexibility for instructors to draw from multiple resources to support course learning without requiring students to spend money on multiple books. 2. Infinite opportunities for collaboration among OER developers.

Self-Check Exercise-9

Ans-1: Lower maintenance cost

Ans-2: True

Ans-3: True

Ans-4: UNESCO's

8.15- References and Suggested Readings:

^ "Internet History -- One Page Summary", *The Living Internet*, Bill Stewart (ed), January 2000.

^ "So, who really did invent the Internet?", Ian Peter, The Internet History Project, 2004. Retrieved 27 June 2014.

Graham, Paul (November 2005). "Web 2.0" Retrieved 2006-08-02 1 firstheard the phrase Web 2.0 in the name of the Web 2.0 conference in 2004

O'Reilly, Tim (2005-09-30), "What Is Web 2.0 O'Reilly Network Retrieved 2006- 08-06

8.16- Terminal Questions:

1. Write a short note on digital library and website.

2. Write a short note on digital library with examples.