Chapter 13

1. Introduction

- ICT refers to all technologies used to handle telecommunications, broadcast media, audiovisual processing and transmission systems, and network-based control and monitoring.
- Includes hardware, software, networks, internet, computers, mobile devices, and communication protocols.
- Plays a vital role in modern society for communication, data sharing, and media content creation and distribution.

2. Digital Signal

A digital signal is a discrete, non-continuous signal that represents information using binary (0s and 1s).

Examples of Digital Signals:

- Binary signals (1 and 0)
- Digital audio (e.g., MP3)
- Digital video (e.g., MP4)
- Text and data on computers
- Digital clocks
- Digital control systems (used in robotics, smart homes)

Characteristics of Digital Signals:

- Represented in binary form (0 and 1)
- Less affected by noise
- Can be compressed and encrypted
- Easily stored and transmitted
- More reliable for long-distance communication

3. Analog Signal

An analog signal is a continuous signal that varies over time and can take any value within a range.

Examples of Analog Signals:

- Audio signals from microphones
- Video signals from analog TV
- Temperature readings from analog sensors
- Voltage signals in power lines
- Pressure sensor outputs

Characteristics of Analog Signals:

- Continuous and smooth
- Sensitive to noise and distortion
- Harder to store or transmit over long distances
- Higher quality for natural inputs but less durable

4. Units of Computer Memory

Unit	Symbol	Size
Bit	b	Smallest unit of data (0 or 1)
Byte	B	8 bits
Kilobyte	KB	1024 bytes
Megabyte	MB	1024 KB
Gigabyte	GB	1024 MB
Terabyte	TB	1024 GB
Petabyte	PB	1024 TB
Exabyte	EB	1024 PB
Zettabyte	ZB	1024 EB
Yottabyte	YB	1024 ZB

5. Differences Between Digital and Analog Signals

Feature	Analog Signal	Digital Signal
Nature	Continuous	Discrete
Data Representation	Waveform	Binary (0, 1)
Noise Resistance	Less	High
Signal Quality	Degrades with distance	Maintained with distance
Processing	Complex	Simple and efficient

6. Signal Transmission

Key Aspects of Signal Transmission:

- Transmitter: Sends the original signal
- Transmission Medium: Medium through which signal travels
  - Wires/cables
  - Optical fibers
  - Wireless channels
- Modulation: Converts data for transmission
- Noise & Interference: Can distort the signal
- Propagation Delay: Time taken for signal to travel
- Receiver: Receives and processes the signal
- Duplexing: Method of sending/receiving simultaneously
- Protocols & Standards: Define communication rules
- Bandwidth: Amount of data that can be transmitted per unit time

7. Components of Digital Communication System

Component	Function
Source	Original data (sound, image, text)
Input Transducer	Converts physical input into electrical signal
Encoder	Converts signal into suitable format for transmission
Modulator	Modifies signal to be carried over medium
Channel	Path through which signal travels
Demodulator	Converts signal back to original form
Decoder	Reconstructs original message
Output Transducer	Converts electrical signal back to physical form
Output Signal	Final form for human use (e.g., sound, image, text)

8. Analog Communication

Features:

- Uses analog signals for transmission
- Quality degrades over distance
- More prone to noise
- Harder to multiplex or secure

9. Digital Communication

Features:

- Uses digital signals (0s and 1s)
- Easy to store, compress, and encrypt
- Noise-resistant
- Ideal for modern applications like internet, phones, and digital media

10. Baseband Transmission

Characteristics:

- Uses entire bandwidth of the medium
- No modulation needed
- Best for short-distance communication (e.g., LANs)

11. Broadband Transmission

Characteristics:

- Transmits multiple signals simultaneously
- Uses modulation
- Suitable for long-distance, high-speed internet

12. Advantages of Digital Transmission

- Better noise immunity
- High security through encryption
- Easy storage and retrieval
- High-speed data transfer
- Compact and portable data systems

13. Effect of Digital Technology on ICT

a. Digital Communication:

- Mobile phones, VoIP, Internet calls

b. Digital Media:

- Online news, blogs, eBooks

c. Digital TV:

- High-definition video and sound
- On-demand streaming

14. Use of Digital Technology in Daily Life

Positive Impacts:

- Improved communication (messaging, video calls)
- Access to information (Google, Wikipedia)
- Entertainment (Netflix, YouTube)
- Education & e-learning (MOOCs, Zoom)
- Global connectivity (social media, online gaming)

Negative Impacts:

- Digital addiction
- Privacy concerns
- Cybersecurity threats
- Social isolation
- Misinformation/Fake news

15. Digital Citizenship (Netizen)

A digital citizen uses technology responsibly, ethically, and legally.

- **Key Aspects:**

- Digital literacy

- Respectful behavior online
- Privacy and security
- Copyright and fair use
- Digital footprint awareness
- Critical thinking
- Online safety
- Balanced technology use
- Responsibility and ethics
- Parental guidance for kids

16. Online Reputation

Your online reputation is how others perceive you based on your digital activity.

Key Aspects:

- Social media posts
- Comments and public interactions
- Online reviews and endorsements
- Respecting others' privacy

17. Digital Wellbeing

Key Aspects:

- Managing screen time
- Avoiding harmful content
- Balancing online and offline life
- Using parental controls
- Mindful technology use

18. Making Audio and Audio-Visual Materials

Video Editing:

Process of altering video footage to create a final product.

Popular Software:

- Adobe Premiere Pro

- Final Cut Pro
- Davinci Resolve
- Filmora
- CapCut (mobile)

Main Steps of Video Editing:

1. Import footage
2. Trim and arrange clips
3. Add transitions and effects
4. Insert titles and captions
5. Adjust audio and color
6. Export the final video

Video Editing Options:

- Cut/split
- Fade in/out
- Slow motion
- Add background music
- Overlay text
- Green screen effects