Computer Network Concepts - Detailed Summary with MCQs

Wired Media Types

- Wired media refers to physical cables used to transmit data. Common types include Twisted Pair, Coaxial, and Fiber Optic cables.
- Twisted Pair cables are often used in LANs and come in two types: Shielded (STP) and Unshielded (UTP).
- Coaxial cables consist of a central conductor, insulator, metallic shield, and plastic cover. They're used for cable internet and TV.
- Fiber Optic cables transmit data as pulses of light, offering very high speed and bandwidth over long distances.
- Wired media provides stable and secure communication with less interference compared to wireless.

MCQs:

1. Which of the following is NOT a wired transmission medium?

   A. Twisted pair

   B. Coaxial cable

   C. Radio waves

   D. Fiber optic

   Answer: C

2. What is the main advantage of fiber optic cables?

   A. Low cost

   B. High speed and bandwidth

   C. Easy installation

   D. Uses electric signals

   Answer: B

3. Which cable is commonly used for cable TV connections?

   A. UTP

   B. STP

C. Coaxial

D. Fiber Optic

Answer: C

4. Twisted pair cables are commonly used in:

A. Satellite communication

B. Local area networks

C. Internet backbone

D. Radio broadcasting

Answer: B

5. STP cables are preferred over UTP when:

A. Cost is more important

B. Interference must be minimized

C. Speed is not an issue

D. Only short distances are involved

Answer: B

Wireless Media Types

- Wireless media transmits data through the air without physical cables.

- Radio waves are widely used in Wi-Fi and AM/FM broadcasting due to their long-range capabilities.

- Microwaves are used for point-to-point communication like cellular networks and satellite links.

- Bluetooth allows short-range communication between personal devices like smartphones and headsets.

- Satellite communication enables long-distance data transmission across continents using orbiting satellites.

MCQs:

1. Which wireless medium is used for short-range communication?

A. Satellite

B. Radio waves

C. Bluetooth

D. Microwaves

Answer: C

2. Satellite communication is suitable for:

A. In-building communication

B. Underwater communication

C. Long-distance global communication

D. Connecting USB devices

Answer: C

3. Which of the following uses microwaves for transmission?

A. Wi-Fi

B. AM radio

C. Satellite

D. Ethernet

Answer: C

4. Radio waves are primarily used in:

A. Bluetooth

B. Fiber optics

C. Coaxial cables

D. Wi-Fi

Answer: D

5. Which media is free from electromagnetic interference?

A. Radio waves

B. Twisted pair

C. Fiber optic

D. Coaxial cable

Answer: C

Types of Twisted Pair Cable

- Twisted pair cables consist of pairs of insulated wires twisted together.

- There are two main types: Shielded Twisted Pair (STP) and Unshielded Twisted Pair (UTP).

- STP cables have additional shielding to reduce electromagnetic interference, suitable for industrial environments.

- UTP cables are less expensive and widely used in home and office networks.

- Both types are used in telephone lines and Ethernet networks for data transmission.

MCQs:

1. What does STP stand for?

   A. Standard Twisted Pair

   B. Shielded Twisted Pair

   C. Shared Twisted Pair

   D. Serial Twisted Pair

   Answer: B

2. UTP cables are:

   A. Expensive and shielded

   B. Unshielded and affordable

   C. Fiber cables

   D. Used for satellite

   Answer: B

3. STP is preferred in environments with:

   A. Noisy electrical equipment

   B. Clean air

   C. Direct sunlight

   D. Underwater cables

   Answer: A

4. The twist in twisted pair cables helps to:

A. Make them stronger

B. Reduce electromagnetic interference

C. Increase weight

D. Prevent color fading

Answer: B

5. UTP cables are mainly used in:

A. TV antennas

B. Ethernet networks

C. Optical transmission

D. Wireless routers

Answer: B

Server Types

- Servers are powerful computers that provide resources and services to other computers on a network.

- A Network Server manages network traffic and resources.

- Database Servers store, retrieve, and manage databases for applications.

- Web Servers host websites and deliver web content via HTTP/HTTPS.

- Other types include Print Servers (handle printing jobs), Proxy Servers (intermediate for client requests), and Exchange Servers (manage email).

MCQs:

1. Which server handles website hosting?

A. Proxy Server

B. Web Server

C. Database Server

D. Print Server

Answer: B

2. A Database Server is responsible for:

A. Sending emails

B. Storing and managing data

C. Printing documents

D. Hosting web content

Answer: B

3. What is the role of a Proxy Server?

A. Printing data

B. Storing files

C. Intermediate client-server communication

D. Network security

Answer: C

4. Which server manages calendars and email?

A. Print Server

B. Database Server

C. Exchange Server

D. Network Server

Answer: C

5. A Print Server is used for:

A. Managing printer access over a network

B. Hosting files

C. Storing emails

D. File encryption

Answer: A

Computer Network Types

- Computer networks can be categorized by architecture and geographical area.

- Client-Server architecture has a centralized server providing services to clients.

- Peer-to-Peer networks allow all devices to act as both clients and servers.

- Geographically, networks are divided into LAN (Local Area Network), MAN (Metropolitan), WAN (Wide Area), and CAN (Campus Area).

- LANs cover small areas, MANs cover cities, WANs cover countries, and CANs cover campuses.

MCQs:

1. A Peer-to-Peer network has:

   A. Central server

   B. No servers at all

   C. Equal clients acting as server and client

   D. Mainframe

   Answer: C

2. A network covering a university campus is:

   A. LAN

   B. MAN

   C. WAN

   D. CAN

   Answer: D

3. Which architecture includes centralized servers?

   A. Client-Server

   B. Peer-to-Peer

   C. Ring

   D. Bus

   Answer: A

4. LAN is typically used in:

   A. City-wide internet

B. Home networks

C. Satellite links

D. Country-wide networks

Answer: B

5. WAN stands for:

A. Wide Area Network

B. Wireless Access Node

C. Wired Area Node

D. Wide Access Network

Answer: A

Topologies

- Network topology defines the arrangement of elements in a communication network.

- Bus Topology uses a single backbone cable; easy to install but hard to troubleshoot.

- Star Topology connects all devices to a central hub; easy to manage and scalable.

- Ring Topology connects devices in a closed loop; data travels in one direction.

- Mesh Topology connects every device to every other device; highly reliable but expensive.

MCQs:

1. Which topology uses a central hub?

A. Bus

B. Star

C. Ring

D. Mesh

Answer: B

2. In which topology do all devices have dedicated point-to-point links?

A. Star

B. Ring

C. Mesh

D. Bus

Answer: C

3. Which topology is most fault tolerant?

A. Mesh

B. Ring

C. Bus

D. Star

Answer: A

4. Data in a Ring Topology travels:

A. Randomly

B. In two directions

C. In one direction

D. Directly to destination

Answer: C

5. Which topology is easiest to install but difficult to maintain?

A. Star

B. Bus

C. Ring

D. Mesh

Answer: B

Communication Media

- Communication media are the physical or wireless means to transfer data.

- Wired media include twisted pair, coaxial, and fiber optic cables.

- Wireless media include radio waves, microwaves, satellite, and Bluetooth.

- Wired media are more secure and faster but less flexible.

- Wireless media offer mobility and are used where wiring is difficult or expensive.

MCQs:

1. Which of the following is not a wireless medium?

   A. Bluetooth

   B. Coaxial cable

   C. Radio wave

   D. Satellite

   Answer: B

2. Fiber optic cables transmit data using:

   A. Electricity

   B. Microwaves

   C. Light

   D. Radio

   Answer: C

3. Which media offers highest mobility?

   A. Fiber optic

   B. Coaxial cable

   C. Wireless

   D. UTP

   Answer: C

4. Wired media is preferred when:

   A. Flexibility is needed

   B. High security is needed

   C. Short term use

   D. Temporary setup

   Answer: B

5. An example of a wireless medium is:

A. Twisted pair

B. Coaxial

C. Bluetooth

D. Fiber optic

Answer: C

OSI Model

- The OSI Model is a conceptual framework for understanding network communication.

- It has 7 layers: Physical, Data Link, Network, Transport, Session, Presentation, and Application.

- The 5-layer model omits the Session and Presentation layers.

- The 3-layer model focuses on Application, Transport, and Network layers for simplicity.

- Each layer has specific functions, such as routing, error handling, and user interface support.

MCQs:

1. How many layers are there in the OSI model?

A. 5

B. 7

C. 3

D. 4

Answer: B

2. Which layer is responsible for routing?

A. Data Link

B. Network

C. Transport

D. Session

Answer: B

3. The Application layer is responsible for:

A. Encryption

B. User interface

C. Error detection

D. Routing

Answer: B

4. The simplified model with 3 layers includes:

A. Session, Network, Physical

B. Application, Transport, Network

C. Data Link, Network, Transport

D. Physical, Data Link, Application

Answer: B

5. Presentation layer handles:

A. Routing

B. Data formatting and encryption

C. Packet transmission

D. Error checking

Answer: B

Modes of Transmission

- Modes of transmission refer to the direction of data flow between devices.

- Simplex mode allows one-way communication only (e.g., keyboard to computer).

- Half Duplex allows two-way communication, but one direction at a time (e.g., walkie-talkies).

- Full Duplex allows simultaneous two-way communication (e.g., phone calls).

- These modes are selected based on application and bandwidth requirements.

MCQs:

1. In which mode can data flow in only one direction?

A. Simplex

B. Half Duplex

C. Full Duplex

D. Duplex

Answer: A

2. Which is an example of Half Duplex communication?

A. Telephone

B. Walkie-talkie

C. Keyboard

D. Printer

Answer: B

3. Full Duplex communication allows:

A. No data flow

B. One-way flow

C. Alternate flow

D. Simultaneous two-way flow

Answer: D

4. Which mode is used by a keyboard?

A. Full Duplex

B. Half Duplex

C. Simplex

D. Bidirectional

Answer: C

5. Telephone uses which transmission mode?

A. Simplex

B. Full Duplex

C. Half Duplex

D. None

Answer: B