



2ND YEAR COMPUTER SCIENCE SOLVED EXERCISE

UNIT #01 — COMPUTER NETWORKS

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Multiple Choice Questions (UNIT #01)

1. A computer network is:

- (a) A single computer system
- (b) A group of connected computers and devices
- (c) A software program
- (d) A storage device

2. The device used to connect a computer to a network is:

- (a) Monitor
- (b) Keyboard
- (c) Network Interface Card (NIC)
- (d) Printer

3. A network that covers a small geographical area, such as a school or office, is:

- (a) WAN
- (b) MAN
- (c) LAN
- (d) Internet

4. The topology that uses a central hub or switch is:

- (a) Bus Topology
- (b) Ring Topology
- (c) Star Topology
- (d) Mesh Topology

5. The OSI model contains:

- (a) Five layers
- (b) Six layers
- (c) Seven layers
- (d) Eight layers

6. The protocol mainly used to view web pages is:

- (a) FTP
- (b) DNS
- (c) TCP
- (d) HTTP

7. The main function of a router is to:

- (a) Store data
- (b) Connect devices within a network
- (c) Connect different networks
- (d) Display web pages

8. DNS is used to:

- (a) Transfer files
- (b) Protect data
- (c) Convert domain names into IP addresses
- (d) Connect hardware devices

9. The device that converts digital signals for Internet transmission is:

- (a) Switch
- (b) Hub
- (c) Modem
- (d) NIC

10. The topology that provides the highest reliability is:

- (a) Bus Topology
- (b) Ring Topology
- (c) Star Topology
- (d) Mesh Topology

MCQ'S Answer Key (UNIT #01):

Q. No	1	2	3	4	5	6	7	8	9	10
Answer	B	C	C	C	C	D	C	C	C	D

Short Questions (UNIT #01)

1. What is a computer network?

Answer: A computer network is a group of connected computers and devices that share data and resources.

- A computer network allow different devices to connect and communicate with each other.
- It help in sharing information quickly and easily
- Communication trough network save time and effort
- Computer network used in schools, homes, offices and businesses

2. Write two uses of computer networks.

Answer: Internet browsing is a common example of network use.

- Mobile phone use network for calls, messages and apps.
- School use network for online classes and learning system
- Bank use network for online transaction and ATM

3. What is network architecture?

Answer: Network architecture is the overall design of a computer network. It shows how computers, servers, and other devices are arranged. It also defines how data is transmitted across the network.

Network architecture includes

- hardware
- Software
- communication rules

A good architecture helps the network work efficiently. It also supports future expansion of the network.

4. Name any two components of a computer network.

Answer: Two components of a computer network are:

1. Network Interface Card (NIC)
2. Router

Other common network components/devices include:

- Switch
- Modem
- Access Point (AP)
- Hub
- Repeater

5. What is the OSI model?

Answer: OSI Model (Open Systems Interconnection)

The OSI model stands for Open Systems Interconnection. It is a standard model used to understand network communication. The OSI model has seven layers. Each layer performs a different function. This model is used for learning and designing networks. It helps different systems communicate properly.

6. Write the name of any two network topologies.

Answer: Any two are:

1. Star Topology
2. Bus Topology

Other common network topologies are:

- Ring Topology
- Mesh Topology
- Tree Topology

- Hybrid Topology

7. What is a Local Area Network (LAN)?

Answer: Local Area Network (LAN)

A Local Area Network connects devices within a small area. This area can be a home, school, or office.

- LAN provides high data transfer speed.
- It is usually owned and managed by a single organization.
- Ethernet and Wi-Fi are commonly used in LANs.
- LAN is cost-effective and easy to maintain.

8. What is the function of a router?

Answer: Router

A router connects different networks together.

- It directs data packets to their correct destination.
- Routers connect local networks to the Internet.
- They use IP addresses to send data.
- Routers improve network security and control.
- Home and office networks use routers widely.

9. What is a network protocol?

Answer: Network Protocols

A network protocol is a set of rules for communication. It defines how data is formatted and transmitted. Protocols control error handling and data delivery. All devices in a network must follow the same protocol. Protocols ensure smooth data exchange.

Examples include TCP/IP and HTTP.

10. What is the purpose of DNS?

Answer: Domain Name System (DNS)

DNS stands for Domain Name System.

- It converts website names into IP addresses.
- DNS makes websites easy to.
- Users do not need to remember numbers. DNS servers perform this translation process.
- It plays a key role in Internet use.

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Long Questions (UNIT #01)

Q.NO 3.1) Define a computer network. Explain its importance and uses in daily life.

Answer: A computer network is a group of connected computers and devices that share data and resources.

- A computer network allow different devices to connect and communicate with each other.
- It help in sharing information quickly and easily
- They allow sharing of resources such as printers and Internet connections.
- They make communication faster and easier.
- They help organizations work efficiently.
- Communication trough network save time and effort
- Computer network used in schools, homes, offices and businesses

Uses of Computer Networks in Daily Life

Internet browsing is a common example of network use. Mobile phone use network for calls, messages and apps. Schools use network for online classes and learning system. Bank use network for online transaction and ATM.

1. Sending Emails and Messages:

Networks allow people to send emails, instant messages, and other information quickly over the Internet.

2. Sharing Files and Documents:

Connected computers can share files, documents, images, and other data with each other.

3. Using the Internet:

Computer networks provide access to websites, search engines, social media, and other online services.

4. Online Learning and Video Conferencing:

Students can attend online classes, watch educational videos, and communicate with teachers through video conferencing.

5. Online Banking and Shopping:

Networks allow people to use online banking services, transfer money, pay bills, and purchase products through online stores.

Q.NO 3.2) Explain network architecture and describe the main components of a computer network.

Answer: Network architecture is the overall design of a computer network. It shows how computers, servers, and other devices are arranged. It also defines how data is transmitted across the network.

Network architecture includes

- hardware
- Software
- communication rules

A good architecture helps the network work efficiently. It also supports future expansion of the network.

Main components of a computer network include:

1. Network Interface Card (NIC)

A Network Interface Card allows a device to connect to a network. It can be wired or wireless. Each NIC has a unique address called MAC address. The NIC sends and receives data from the network. Without a NIC, a device cannot communicate on a network. NICs are built into most modern devices.

2. Switch

A switch connects devices and sends data to the correct device. Switches improve network speed and efficiency. Switches are common in modern networks.

3. Router

A router connects different networks together. It directs data packets to their correct destination. Routers connect local networks to the Internet. They use IP

addresses to send data. Routers improve network security and control. Home and office networks use routers widely.

4. Modem

A modem connects a local network to an Internet Service Provider (ISP). It converts digital data into signals suitable for transmission. It also converts incoming signals back into digital form. Modems are used with cable, DSL, or fiber connections. Internet access depends on a modem. Modems often work with routers.

5. Wireless access point

A wireless access point provides Wi-Fi connectivity. It allows wireless devices to connect to a network. It extends wireless network coverage. Access points are used in large buildings and campuses. They improve signal strength and stability. Wireless access points support mobile connectivity.

Q.NO 3.3) What is the OSI model? Explain its layers and their functions.

Answer: OSI Model (Open Systems Interconnection)

The OSI model stands for Open Systems Interconnection. It is a standard model used to understand network communication. The OSI model has seven layers.

1. Physical Layer
2. Data Link Layer
3. Network Layer
4. Transport Layer
5. Session Layer
6. Presentation Layer
7. Application Layer

This model is used for learning and designing networks. It helps different systems communicate properly. Each layer performs a different function.

Functions of OSI Model Layers

Each OSI layer has a specific role in data communication. The physical layer sends raw data signals. The data link layer controls error-free transfer. The network layer handles

routing of data. The transport layer ensures reliable delivery. The session, presentation, and application layers support user interaction and data formatting.

1. Physical Layer: Sends raw data as electrical, optical, or radio signals over the medium. It defines hardware aspects such as cables, connectors, voltage levels, and data transmission rates.

2. Data Link Layer: Ensures error-free data transfer between directly connected nodes. It handles framing, error detection/correction, and controls access to the shared transmission medium.

3. Network Layer: Responsible for routing data from source to destination across different networks. It manages logical addressing (IP addresses) and determines the best path for data delivery.

4. Transport Layer: Provides reliable and ordered delivery of data between devices. It performs error recovery, flow control, and segmentation of data into smaller units.

5. Session Layer: Establishes, maintains, and terminates communication sessions between applications. It manages session checkpoints and recovery in case of interruptions.

6. Presentation Layer: Translates data into a format understandable by the application layer. It handles data encryption, compression, and format conversion.

7. Application Layer: Provides services directly to end users and applications. It supports protocols like HTTP, FTP, and email services for communication and data exchange.

Q.NO 3.4) Define network topology. Explain bus, star, ring, and mesh topologies with advantages and disadvantages.

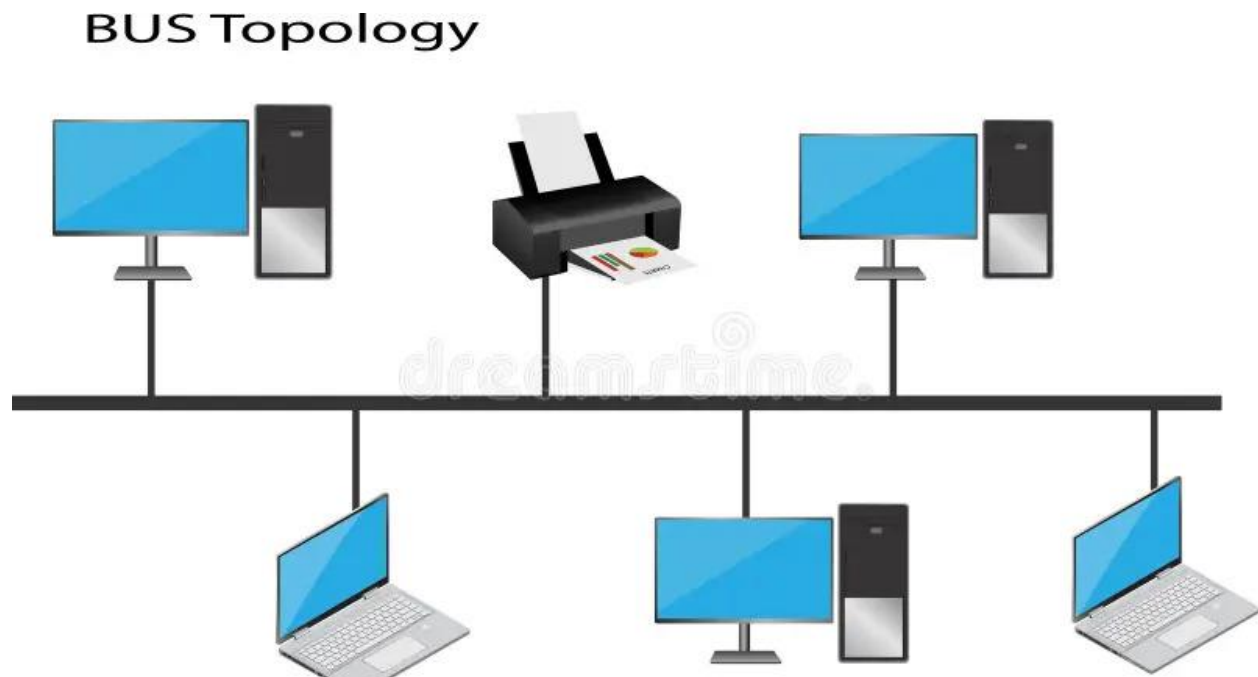
Network Topologies

Network topology refers to the layout of a computer network. It explains how devices and cables are arranged. Topology can be physical or logical. Physical topology shows

actual connections. Logical topology shows how data flows in the network. Topology affects network performance and maintenance.

Bus Topology

In bus topology, all devices are connected to a single main cable. Data travels along this cable to each device. It is simple and low in cost. Failure of the main cable can stop the entire network (as shown in Figure). It is suitable for small networks. Bus topology is not good for large networks.



Star Topology

In star topology, all devices connect to a central hub or switch. Data passes through the central device. It is easy to manage and expand. Failure of one device does not affect others. Failure of the central hub stops the network. Star topology is widely used in modern networks.

Ring Topology

In ring topology, devices are connected in a circular path. Data moves in one direction around the ring. Each device receives data and passes it along. Failure of one device can affect the whole network. It is more complex than bus topology. Ring topology is rarely used today.

Mesh Topology

In mesh topology, devices are connected to many other devices. Multiple paths exist for data transmission. This increases reliability and fault tolerance. Failure of one link does not stop communication. Mesh topology is expensive and complex. It is used in large and critical networks.

In this topology, each device is connected to many other devices. Data can travel through multiple paths to reach its destination. If one connection fails, data can use another path. This figure explains why mesh topology is very reliable but complex.

Topology	Advantages	Disadvantages
Bus Topology	• Simple and easy to install • Requires less cable • Cost-effective	• Failure of main cable affects the whole network • Difficult to troubleshoot • Performance decreases with more devices
Star Topology	• Easy to install and manage • Failure of one device does not affect others • Easy to detect faults	• Central device failure stops the entire network • Requires more cable • Higher cost
Ring Topology	• Data flows in an organized manner • No data collision • Equal access for all devices	• Failure of one device affects the whole network • Difficult to add/remove devices • Rarely used today
Mesh Topology	• Highly reliable and fault-tolerant • Multiple paths for data	• Very expensive • Complex installation • Requires a large number of cables

Q.NO 3.5) Explain the types of computer networks. Describe LAN, WAN, and the Internet.

Answer: A computer network is a group of connected computers and devices that share data and resources.

- A computer network allow different devices to connect and communicate with each other.
- It help in sharing information quickly and easily
- Communication trough network save time and effort
- Computer network used in schools, homes, offices and businesses

Types of Computer Networks

Computer networks are classified based on size and coverage area. Different types of networks are used for different purposes. Each type connects devices in a specific way. The most common types are LAN, WAN, and the Internet (Public WAN).

Local Area Network (LAN)

A Local Area Network connects devices within a small area. This area can be a home, school, or office. LAN provides high data transfer speed. It is usually owned and managed by a single organization. Ethernet and Wi-Fi are commonly used in LANs. LAN is cost-effective and easy to maintain.

Wide Area Network (WAN)

A Wide Area Network covers a large geographic. It connects networks in different cities or countries. WAN uses leased lines, satellites, or the Internet. Data transfer speed is slower than LAN. WAN is expensive to install and manage. The Internet is the largest example of a WAN.

The Internet (Public WAN)

The Internet is a global network connecting millions of devices. It allows sharing of information worldwide. Services like email, websites and cloud storage use the Internet. It uses standard protocols for communication. The Internet supports education, business, and entertainment. It plays an important role in daily life.

Q.NO 3.6) Describe the main networking devices used in a computer network and explain their functions.

Answer:

Networking Devices

Networking devices are used to connect computers and other devices in a network. These devices control the flow of data. Each device has a specific role in communication.

The main networking devices include:

Network Interface Card (NIC)

A Network Interface Card allows a device to connect to a network. It can be wired or wireless. Each NIC has a unique address called MAC address. The NIC sends and receives data from the network. Without a NIC, a device cannot communicate on a network. NICs are built into most modern devices.

Switch

A switch connects devices and sends data to the correct device. Switches improve network speed and efficiency. Switches are common in modern networks.

Router

A router connects different networks together. It directs data packets to their correct destination. Routers connect local networks to the Internet. They use IP addresses to send data. Routers improve network security and control. Home and office networks use routers widely.

Modem

A modem connects a local network to an Internet Service Provider (ISP). It converts digital data into signals suitable for transmission. It also converts incoming signals back into digital form. Modems are used with cable, DSL, or fiber connections. Internet access depends on a modem. Modems often work with routers.

Wireless access point

A wireless access point provides Wi-Fi connectivity. It allows wireless devices to connect to a network. It extends wireless network coverage. Access points are used in large buildings and campuses. They improve signal strength and stability. Wireless access points support mobile connectivity.

Q.NO 3.7) What are network protocols? Explain TCP/IP, HTTP, FTP, and DNS.

Answer:

Network Protocols

A network protocol is a set of rules for communication. It defines how data is formatted and transmitted. Protocols control error handling and data delivery. All devices in a network must follow the same protocol. Protocols ensure smooth data exchange. Examples include TCP/IP, HTTP, FTP, and DNS.

Transmission Control Protocol and Internet Protocol (TCP/IP)

TCP/IP stands for Transmission Control Protocol and Internet Protocol. It is the main protocol used on the Internet. TCP ensures reliable data delivery. IP handles the addressing and routing of data. Together, TCP/IP enables communication between devices. It is used in almost all networks.

Hypertext Transfer Protocol (HTTP)

HTTP stands for Hypertext Transfer Protocol. It is used to transfer web pages. HTTP works between a web browser and a web server. It allows users to view websites. HTTP does not encrypt data; secure websites use HTTPS instead. HTTPS is the secure version of HTTP. It uses encryption to protect data transmitted between a web browser and a web server. This encryption is provided using SSL/TLS protocols, which ensure that sensitive information such as passwords, personal details, and payment data cannot be easily intercepted by attackers.

File Transfer Protocol (FTP)

FTP stands for File Transfer Protocol. It is used to upload and download files. FTP allows file sharing between computers. It is commonly used by web developers. FTP can transfer large files. Secure versions of FTP are also available.

Domain Name System (DNS)

DNS stands for Domain Name System. It converts website names into IP addresses. DNS makes websites easy to access (as shown in Figure 1.14). Users do not need to remember numbers. DNS servers perform this translation process. It plays a key role in Internet use.

Q.NO 3.8) Explain IP addressing. Describe IPv4, IPv6, the default gateway, and subnetting.

Answer:

IP Addressing:

An IP address is a unique number assigned to a device on a network. IP stands for **Internet Protocol**. It identifies devices and helps data find its correct destination. Every network device needs an IP address for communication.

IPv4:

IPv4 is an older version of IP addressing. It uses **32-bit numeric addresses**. An IPv4

address has four numbers, each ranging from **0 to 255**, separated by dots.

Example: 192.168.1.10

IPv6:

IPv6 is the newer version of IP addressing. It uses **128-bit addresses** and provides a much larger address space than IPv4.

Example: 2001:0db8:85a3:0000:0000:8a2e:0370:7334

Default Gateway:

A default gateway is a device, usually a **router**, that allows devices on a local network to communicate with other networks.

Subnetting:

Subnetting is the process of dividing a network into smaller networks called **subnets**. It helps reduce network traffic, improve performance and security, and makes large networks easier to manage.

Example:

192.168.1.0/24 can be divided into smaller subnets such as:

- 192.168.1.0/25
- 192.168.1.128/25