Unit no 06: Introduction to Computer Networks

Short Answer Questions:

1. Define Data Communication. And list its key components.

Data communication refers to the exchange of messages between sending and receiving devices through some communication medium.

The following are the main components of data communication:

- Sender
- Receiver
- Message
- Protocol
- Transmission Media

2. Explain the role of routers in a computer network.

A router is a networking device that interconnects networks or allows devices to connect to it. It directs data packets between different networks. Think of it as a traffic director on the internet, making sure that data gets from one place to another efficiently.

3. What are the main functions of Network Layer in the OSI Model?

The Network Layer is responding to data transfer between different networks. It determines the best path for data to travel from the source to the destination.

Example:

Imagine a GPS system that finds the best route for you to travel from home to school.

4. Describe the difference between packet switching and circuit switching.

Circuit switching establishes a dedicated communication path between sender and receiver for the entire duration of the session, reserving resources throughout, which ensures consistent delay and high reliability—commonly used in traditional telephone networks. In contrast, packet switching breaks data into smaller packets that are sent independently over the network, each possibly taking a different route, making it more efficient and suitable for internet data transfer, though it may introduce variable delays and require reordering at the destination.

Circuit Switching is like booking an entire train track from point A to B before you start.

Packet Switching is like sending letters where each letter (packet) finds its own way to the destination.

5. What is the purpose of the Dynamic Host Configuration Protocol (DHCP)?

DHCP automatically assigns IP addresses to devices on a network, simplifying network management.

Example:

When a device connects to a Wi-Fi network, DHCP assigns it an IP address.

6. How does encapsulation ensure secure communication in a network?

The actual content of the message called payload, is hidden inside the header at each layer, this is called encapsulation.

7. Differentiate between TCP and UDP in terms of data transfer reliability.

Transmission Control Protocol: TCP

Ensures reliable data transfer.

User Diagram Protocol: UDP

Provides faster, but less reliable, data transfer.

8. Explain the importance of encryption in network security?

Encryption transforms data into a secure format that can only be read or understood by authorized parties with the correct decryption key. Decryption is the process of converting the encrypted data back to its original form.

9. What are the advantages of using a Star Topology in network security?

Advantages:

- Star topology is more reliable and supports large number of computers than bus topology.
- It is easier to detect and fix errors than bus topology.

10. How do firewalls contribute to network security?

Firewalls are security systems that monitor and control incoming and outgoing network traffic based on predetermined security rules. Firewalls act as barriers between trusted internal networks and untrusted external networks, like a security checkpoint.