**Module -7: Network fundamental**

1- Which of the following messages in the DHCP process are broadcasted? (Choose two)

A. Request

B. Offer

C. Discover

D. Acknowledge

2- Which command would you use to ensure that an ACL does not block web-based TCP traffic?

A. permit any

B. permit tcp any any eq 80

C. permit tcp any eq 80

D. permit any any eq tcp

**3-Explain Network Topologies**

 **Bus Topology**:

All devices are connected to a single central cable (bus).

**Advantage**: Cost-effective.

**Disadvantage**: If the main cable fails, the entire network goes down.

 **Star Topology**:

Devices are connected to a central hub or switch.

**Advantage**: Easy to manage and troubleshoot.

**Disadvantage**: If the central hub fails, the network is disrupted.

 **Ring Topology**:

Devices are connected in a circular fashion, with each device connected to two others.

**Advantage**: Data travels in one direction, reducing the chance of collisions.

**Disadvantage**: If one device fails, the whole network can be affected.

**4-Explain TCP/IP Networking Model**

The TCP/IP model is a set of protocols used for communication over the internet. It has four layers:

**Application Layer**:

Where network applications operate (e.g., HTTP for web browsing).

**Transport Layer**:

Ensures reliable data transfer between devices (e.g., TCP for reliable communication, UDP for faster, less reliable communication).

**Internet Layer**:

Manages data routing across the network (e.g., IP for addressing and routing).

**Network Interface Layer**:

Handles the physical transmission of data over a network (e.g., Ethernet, Wi-Fi).

**5-Explain LAN and WAN Network.**

**LAN (Local Area Network)**:

**Scope**: Covers a small, localized area, like a home, office, or school.

**Speed**: Typically offers high-speed data transfer.

**Usage**: Connects devices within close proximity, such as computers, printers, and servers.

**WAN (Wide Area Network)**:

**Scope**: Spans a large geographical area, like a city, country, or even globally.

**Speed**: Generally slower than LAN due to longer distances.

**Usage**: Connects multiple LANs together, often through public networks like the internet.

**6-Explain Operation of Switch**

A switch connects multiple devices in a LAN and manages data flow between them:

**Learning**: It records the MAC addresses of devices and the ports they're connected to.

**Forwarding**: It sends data only to the specific device (port) based on the MAC address, ensuring efficient communication.

**Filtering**: It prevents data from being sent to unnecessary devices, reducing network congestion.

**7. Describe the purpose and functions of various network devices.**

 **Router**:

**Purpose**: Connects different networks and routes data between them.

**Function**: Determines the best path for data to travel between networks, often connecting LANs to the internet.

 **Switch**:

**Purpose**: Connects multiple devices within the same network (LAN).

**Function**: Forwards data to the correct device based on MAC addresses, ensuring efficient data transfer.

 **Hub**:

**Purpose**: Connects multiple devices in a LAN.

**Function**: Broadcasts data to all devices on the network, leading to potential collisions and less efficiency.

 **Modem**:

**Purpose**: Connects a network to the internet.

**Function**: Converts digital data from a computer to analog signals for transmission over phone lines or cable, and vice versa.

 **Access Point (AP)**:

**Purpose**: Extends the wireless range of a network.

**Function**: Provides wireless connectivity to devices, allowing them to connect to a wired network.

 **Firewall**:

**Purpose**: Protects the network from unauthorized access.

**Function**: Monitors and controls incoming and outgoing network traffic based on security rules.

**8. Make list of the appropriate media, cables, ports, and connectors .**

**1. Ethernet (Wired Networking)**

**Media**: Twisted Pair Cable (e.g., Cat5e, Cat6, Cat6a)

**Cable**: Ethernet Cable (e.g., Cat5e, Cat6)

**Ports**: RJ45 Port

**Connectors**: RJ45 Connector

**2. Fiber Optic (High-Speed Networking)**

**Media**: Fiber Optic Cable

**Cable**: Single-mode Fiber (SMF) or Multi-mode Fiber (MMF)

**Ports**: SC, ST, LC, FC Ports

**Connectors**: SC, ST, LC, FC Connectors

**3. Wi-Fi (Wireless Networking)**

**Media**: Radio Waves

**Cable**: N/A (wireless communication)

**Ports**: N/A (wireless communication)

**Connectors**: N/A (wireless communication)

**4. Coaxial (Cable Internet and Older Networks)**

**Media**: Coaxial Cable

**Cable**: RG6, RG59 Cable

**Ports**: Coaxial Port

**Connectors**: F-Type Connector

**5. Serial Communication (Older Networking/Device Configuration)**

**Media**: Serial Cable

**Cable**: DB9 Cable

**Ports**: Serial Port (DB9)

**Connectors**: DB9 Connector

**6. USB (Peripheral Device Connection)**

**Media**: USB Cable

**Cable**: USB 2.0, USB 3.0, USB-C Cable

**Ports**: USB Port (Type A, Type B, Type C)

**Connectors**: USB Connector (Type A, Type B, Type C)

**7. HDMI (Audio/Video Transmission)**

**Media**: HDMI Cable

**Cable**: Standard HDMI Cable

**Ports**: HDMI Port

**Connectors**: HDMI Connector

**8. Telephone Lines (Dial-up Internet/Older Communication)**

**Media**: Twisted Pair Cable

**Cable**: Telephone Cable

**Ports**: RJ11 Port

**Connectors**: RJ11 Connector

**9-Define Network devices and hosts.**

**Network Devices**:

**Definition**: Hardware used to connect, manage, and control network traffic and connectivity.

**Examples**: Routers, switches, hubs, modems, access points, firewalls.

**Hosts**:

**Definition**: Devices that are connected to a network and use network resources or provide services.

**Examples**: Computers, servers, printers, smartphones, tablets.