Assignment: module -5 Network Fundamentals and Building Networks

Section 1: Multiple Choice

1. What is the primary function of a router in a computer network?

   a) Assigning IP addresses to devices

   b) Providing wireless connectivity to devices

   c) Forwarding data packets between networks

   d) Managing user authentication and access control

   Ans: **c) Forwarding data packets between networks**

   Note: The primary function of a router is to forward data packets between different networks. It determines the best path for data to travel and ensures it reaches its intended destination.

2. What is the purpose of DHCP (Dynamic Host Configuration Protocol) in a computer network?

   a) Assigning static IP addresses to devices

   b) Resolving domain names to IP addresses

   c) Managing network traffic and congestion

   d) Dynamically assigning IP addresses to devices

   Ans: **d) Dynamically assigning IP addresses to devices**

   Note: The purpose of DHCP (Dynamic Host Configuration Protocol) is to dynamically assign IP addresses to devices on a network.

3. Which network device operates at Layer 2 (Data Link Layer) of the OSI model and forwards data packets based on MAC addresses?

   a) Router

   b) Switch

   c) Hub

   d) Repeater

   Ans: **b) Switch**

   Note: A **switch** operates at Layer 2 (Data Link Layer) of the OSI model and forwards data packets based on MAC (Media Access Control) addresses.

4. Which network topology connects all devices in a linear fashion, with each device connected to a central cable or backbone?

a) Star

b) Bus

c) Ring

d) Mesh

Ans: **b) Bus**

Note : In a **bus topology**, all devices are connected in a linear fashion to a central cable, also known as the backbone.

Section 2: True or

5.True or False: A VLAN (Virtual Local Area Network) allows network administrators to logically segment a single physical network into multiple virtual networks, each with its own broadcast domain.

Ans: **True**

Note: A VLAN (Virtual Local Area Network) allows network administrators to logically segment a single physical network into multiple virtual networks.

6.True or False: TCP (Transmission Control Protocol) is a connectionless protocol that provides reliable, ordered, and error-checked delivery of data packets over a network.

Ans: **False**

Note: TCP (Transmission Control Protocol) is a **connection-oriented** protocol, not connectionless. It provides reliable, ordered, and error-checked delivery of data packets over a network by establishing a connection before data transfer begins.

7.True or False: A firewall is a hardware or software-based security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules.

Ans: **True**

note: A firewall is a hardware or software-based security system designed to monitor and control incoming and outgoing network traffic based on predetermined security rules.

8.   Describe the steps involved in setting up a wireless network for a small office or home office (SOHO) environment.

Ans:

1. **Plan the Network**: Determine coverage needs, devices, and ISP plan.

2. **Gather Equipment**: Get a wireless router, modem, and Ethernet cables.
3. **Connect Hardware**: Link the modem to the router's WAN port and power both devices.
4. **Access Router Settings**: Use a browser to log in to the router's configuration page.
5. **Set Up Wi-Fi**: Configure the SSID, choose WPA2/WPA3 security, and set a strong password.
6. **Optimize Settings**: Enable DHCP, configure firewalls, and optionally set up a guest network.
7. **Test Connectivity**: Connect devices and ensure proper internet access.
8. **Secure the Network**: Change the router's admin credentials and update firmware.
9. **Position the Router**: Place it centrally for optimal signal coverage.
10. **Maintain**: Regularly review settings and connected devices for security.

Section 4: Practical

9.   Demonstrate how to configure a router for Internet access using DHCP (Dynamic Host Configuration Protocol).

Ans: Steps to Configure a Router for Internet Access with DHCP:

1. **Connect Devices**:
   a. Connect the modem to the router's WAN port using an Ethernet cable.
   b. Power on both the modem and router.
2. **Connect to the Router**:
   a. Use a computer or smartphone to connect to the router's default Wi-Fi network or via Ethernet.
3. **Access Router Settings**:
   a. Open a web browser and enter the router's IP address (e.g., `192.168.1.1`).
   b. Log in with the default username and password (usually found in the manual).
4. **Set WAN Connection Type**:
   a. Navigate to the **WAN** or **Internet Settings** section.
   b. Select **Dynamic IP (DHCP)** as the connection type.
5. **Save Settings**:
   a. Save the changes and reboot the router if necessary.
6. **Test Internet Connection**:
   a. Connect a device to the router and check if you have Internet access.
7. **Configure Wi-Fi (Optional)**:
   a. Set up the Wi-Fi SSID and password for secure wireless access.

Section 5:

10.   Discuss the importance of network documentation in the context of building and managing networks.

Ans:

1. Improved Understanding

- Documentation provides a clear overview of the network architecture, including devices, configurations, and interconnections. This helps network administrators and engineers understand the network's design and functionality.

2. Efficient Troubleshooting

- When issues arise, having detailed documentation allows IT staff to quickly identify problems and determine their root causes. This can significantly reduce downtime and improve response times.

3. Change Management

- Network documentation serves as a baseline for changes and upgrades. Keeping records of configurations, IP addresses, and changes helps ensure that modifications are properly planned and executed, reducing the risk of errors.

4. Compliance and Security

- Many industries have regulatory requirements that mandate proper documentation of network configurations and security measures. Accurate documentation aids in compliance audits and helps maintain security protocols.

5. Knowledge Transfer

- In organizations with multiple IT staff, documentation facilitates knowledge transfer. New team members can refer to documentation to understand the network setup and procedures, minimizing the learning curve.

6. Capacity Planning

- Documenting network performance metrics and usage patterns allows for better capacity planning. Organizations can analyze data to forecast future needs and make informed decisions regarding upgrades and expansions.

7. Disaster Recovery

- Comprehensive network documentation is essential for disaster recovery planning. In the event of a failure, having detailed information about the network setup enables faster recovery and restoration of services.

8. Support for Remote Work

- With the rise of remote work, clear network documentation ensures that remote staff can access resources and understand network configurations without direct assistance