**Name: Montu Jangid**

**Batch: Hardware (Abdul Hamid Sir) 9:30am to 10:30am**

**Assignment**

**Module - 3 : Understanding and Maintenance of network**

## Section 1: Multiple Choice

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

**Ans: Forwarding data packets between networks**

2. What is the purpose of DNS (Domain Name System) in a computer network?

**Ans: Converting domain names to IP addresses**

3.What type of network topology uses a centralized hub or switch to connect all devices?

**Ans: Star**

4. Which network protocol is commonly used for securely accessing and transferring files over a network?

**Ans: FTP**

## Section 2: True or False

5. 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**

6. DHCP (Dynamic Host Configuration Protocol) assigns static IP addresses to network devices automatically.

**Ans: False**

7. VLANs (Virtual Local Area Networks) enable network segmentation by dividing a single physical network into multiple logical networks.

**Ans: True**

## Section 3: Short Answer

8. Explain the difference between a hub and a switch in a computer network.

Ans:

| Feature | Hub | Switch |
|---|---|---|
| **1. Function** | **Sends data to all connected devices (broadcast).** | **Sends data only to the intended device (unicast).** |
| **2. OSI Layer** | **Operates at Layer 1 (Physical Layer).** | **Operates at Layer 2 (Data Link Layer).** |
| **3. Efficiency** | **Less efficient - causes unnecessary network traffic.** | **More efficient - reduces unnecessary data flow.** |

| | | |
|---|---|---|
| **4. Bandwidth** | **Shared among all ports - leads to collisions.** | **Dedicated per port - no collisions.** |
| **5. MAC Address Use** | **Does not use MAC addresses - sends blindly.** | **Learns and uses MAC addresses to forward data accurately.** |
| **6. Intelligence** | **Not intelligent - no decision-making ability.** | **Intelligent - decides where to send the data.** |
| **7. Security** | **Low security - all data is visible to all devices.** | **High security - data is sent only to the correct device.** |
| **8. Cost** | **Cheaper, used in small/basic networks.** | **Costlier, preferred in modern and large networks.** |

9. Describe the process of troubleshooting network connectivity issues.

Ans:

**Troubleshooting network connectivity involves identifying and fixing problems that prevent devices from accessing the internet or communicating with each other. Here is a step-by-step process to effectively troubleshoot such issues:**

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### ◈ 1. Identify the Problem

- Ask what exactly is not working - is it internet access, local network sharing, or both?
- Check if the issue affects one device or multiple devices.

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### ◈ 2. Check Physical Connections

- Ensure all cables (Ethernet, power) are securely plugged in.
- Check if the router, modem, and switch are powered on and showing proper LED signals.
- If wireless, check the Wi-Fi signal strength.

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### ◈ 3. Verify IP Address and Configuration

- Use commands like ipconfig (Windows) or ifconfig (Linux/Mac) to check:
  - IP address
  - Subnet mask
  - Default gateway
- If IP is invalid (e.g., 169.x.x.x), the device didn't receive an IP from the router.

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### ◈ 4. Use Ping to Test Connectivity

- ping 127.0.0.1 - tests your own device's network adapter.
- ping <default gateway> - checks router connectivity.
- ping 8.8.8.8 - checks internet access.
- ping google.com - checks if DNS is working.

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### 🔷 5. Restart Network Devices

- Restart your modem, router, switch, and affected device.
- This helps reset network configurations and clear temporary glitches.

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### 🔷 6. Check DNS Settings

- If websites don’t load but ping to IPs works, DNS might be the problem.
- Try switching to public DNS servers like **Google DNS (8.8.8.8)**.

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### 🔷 7. Disable Firewall and Antivirus (Temporarily)

- Sometimes, firewalls or security software can block connections.
- Temporarily disable them to check if they are causing the issue.

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### 🔷 8. Update or Reinstall Network Drivers

- Outdated or corrupted drivers can cause problems.
- Update network adapter drivers from the device manager or reinstall them.

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### 🔷 9. Reset Network Settings (if needed)

- Use built-in network reset options on your OS to restore default settings.
    - Windows: Settings > Network & Internet > Network Reset

### 🔷 10. Contact ISP or Network Admin

- If everything seems fine locally but there’s no internet, the issue may be with your **Internet Service Provider**.

## Section 4: Practical Application

10. Demonstrate how to configure a wireless router's security settings to enhance network security.

**Ans: Done**

## Section 5: Essay

11. Discuss the importance of network documentation and provide examples of information that should be documented.

Ans:

### 🔷 What is Network Documentation?

Network documentation is the process of recording detailed information about a computer network’s design, devices, configuration, and procedures. It acts like a **blueprint** of your network and is crucial for maintenance, troubleshooting, and future upgrades.

### 🔷 Importance of Network Documentation (Why It’s Important):

1. ✅ **Helps in Troubleshooting Problems**
    - If something stops working, you can check the documentation to quickly find and fix the issue.

- Saves time by showing you how the network is set up.

2. 🔁 **Speeds Up Recovery After Failures**
   - If the network goes down, you can restore it quickly using saved settings and device information.
3. 🔐 **Improves Security**
   - Keeps track of who has access, what devices are connected, and where threats can come from.
   - Helps you close any unused ports or remove outdated users.
4. 🔄 **Makes Upgrades and Changes Easier**
   - You know exactly what's already installed, so you can upgrade without breaking anything.
   - Helps avoid mistakes when changing wires, devices, or settings.
5. 👨‍💻 **Supports Teamwork**
   - Everyone working on the network can follow the same information.
   - Reduces confusion between team members or future technicians.
6. 📂 **Helps with Audits and Legal Compliance**
   - Some companies or industries need proof of how the network is managed.
   - Makes it easy to show network records during audits or security checks.
7. □ **Saves Expert Knowledge**
   - If your network expert leaves the company, their knowledge is saved in documentation.

- New staff can understand and manage the network easily.

8. 📊 **Improves Decision-Making**
    - Helps managers plan upgrades or investments based on the current network layout and performance.

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### 📝 Examples of What Should Be Documented (What to Write Down):

1. 🌐 **Network Topology Diagram**
    - A drawing or map that shows how computers, routers, switches, and other devices are connected.
2. 🖥️ **Device Inventory**
    - List of all network devices with:
        - Device name (e.g., Router1, SwitchA)
        - Type (router, server, switch, etc.)
        - Brand and model number
        - IP address and MAC address
        - Serial number
        - OS or firmware version
3. 🔑 **IP Addressing Plan**
    - Information on:
        - Static IPs (fixed)
        - DHCP ranges (automatically assigned)
        - Subnet masks
        - Default gateways

4. 🔐 **Security Settings**
    - Firewall rules (what is allowed/blocked)
    - VPN details (virtual private network setup)
    - Password policies
    - Who has access to what devices
5. ⚙️ **Configuration Backups**
    - Save copies of settings for routers, switches, firewalls, etc.
    - Include the date of last update or change.
6. ⏳ **Backup and Restore Plans**
    - How and when backups are done
    - Where backups are stored
    - Steps to restore network from backups
7. 🛠️ **Maintenance and Repair Logs**
    - What was fixed or changed
    - When the maintenance happened
    - Who did the work
8. □ **Testing and Troubleshooting Steps**
    - How to check network speed or performance
    - Common problems and their solutions
    - Testing tools used (e.g., Ping, Traceroute)
9. 📞 **Vendor and Support Contacts**
    - Contact info for:
        - Internet Service Providers (ISP)
        - Hardware vendors (e.g., Cisco, HP)

    - Software or security tool providers

10. 🗓️ **Change History**

- Records of all major changes made to the network.
- Example: “Upgraded router firmware on March 2, 2025.”