**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

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

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

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

Section 2: True or false

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.

🡪True

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.

🡪False

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.

🡪True

Section 3:

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

🡪1. **Choose the Right Wireless Router**

2. **Set Up the Wireless Router**

3. **Configure Network Settings**

4. **Set Up Additional Router Features (Optional but Recommended)**

5. **Secure Your Wireless Network**

6. **Connect Devices to the Wireless Network**

7. **Monitor and Optimize the Network**

8. **Optional: Set Up Wired Devices**

9. **Document Network Settings**

Section 4: Practical

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

#### 🡪1. **Connect Your Hardware**

* **Router to Modem**: Connect the router's **WAN (Wide Area Network)** or **Internet** port to the modem provided by your Internet Service Provider (ISP) using an Ethernet cable.
* **Router to Devices**: Connect your computer or other devices to the router using either **wired Ethernet** (via LAN ports) or **wireless Wi-Fi** (after the router is configured).

#### 2. **Access the Router's Web Interface**

* Open a web browser (e.g., Chrome, Firefox, Edge) on a device connected to the router.
* Type the router's IP address into the address bar. Common router IPs are:
  + **192.168.1.1**
  + **192.168.0.1**
  + **192.168.100.1**
* Press **Enter** to access the router’s login page.
* You will be prompted to log in. Use the default login credentials, which are typically:
  + **Username**: admin or admin (depending on the router)
  + **Password**: admin or the password found on the router label (could be something like password, 1234, or a specific key printed on the device).

If you have already changed the default login credentials, use those instead.

#### 3. **Configure WAN (Internet) Connection Settings**

* Once logged in, navigate to the **WAN** or **Internet settings** section of the router’s configuration interface.
* Here, you'll need to configure the router to use DHCP for **automatic IP addressing** from your ISP.
  + Look for a section called **Internet Connection Type** or **WAN Connection Type**.
  + Select **Dynamic IP (DHCP)** from the available options. This is the mode that allows the router to automatically obtain an IP address from your ISP's DHCP server.

**Typical connection types** in this section might include:

* + **Dynamic IP (DHCP)** – Use this if your ISP provides dynamic IP addressing.
  + **Static IP** – Use this if your ISP assigns a static IP address to you (you would need the specific IP, subnet mask, and gateway provided by the ISP).
  + **PPPoE** (Point-to-Point Protocol over Ethernet) – Use this if your ISP requires a username and password for authentication (common for DSL connections).

Choose **Dynamic IP (DHCP)**, which is the most common setup for home or small office networks.

#### 4. **Enable DHCP for Local Network (LAN)**

* In this section, you’ll configure **DHCP** for your local network so that devices connected to the router (wired or wireless) can automatically receive IP addresses.
* Navigate to the **LAN** or **DHCP settings** on the router's web interface.
* Ensure **DHCP Server** is enabled. This will allow the router to assign IP addresses to devices on your network automatically.
  + **Start IP address**: Set the starting IP address range for the DHCP pool. For example, if your router's IP is 192.168.1.1, you might set the starting range as 192.168.1.100.
  + **End IP address**: Set the end IP address range for the DHCP pool. For example, you could set it as 192.168.1.200, which means the router will assign IP addresses between 192.168.1.100 and 192.168.1.200 to devices on the network.
  + **Subnet Mask**: This is typically set to 255.255.255.0 for home networks.
  + **Lease Time**: The lease time determines how long an IP address is assigned to a device. This is usually set to 24 hours by default.

**Example:**

* IP range: 192.168.1.100 to 192.168.1.200
* Subnet Mask: 255.255.255.0
* Lease Time: 24 hours

#### 5. **Configure Wireless Settings (if needed)**

* If you're configuring the router for wireless use, navigate to the **Wireless Settings** section.
* Set up the **SSID** (network name), ensuring it is unique so you can easily identify your network.
* **Security**: Choose a security method (preferably **WPA3** or **WPA2** for encryption) and set a strong password to prevent unauthorized access.
* You can also set the router to use either the **2.4 GHz** or **5 GHz** frequency bands, or both if your router supports **dual-band Wi-Fi**.

#### 6. **Save Settings**

* After configuring the WAN and LAN settings, **save** your changes. The router may reboot to apply the settings.
* Ensure the router is now connected to the internet by checking the router’s **status page**. It should show an IP address assigned by the ISP under the **WAN/Internet** section.

#### 7. **Test the Connection**

* **Check the internet**: On a computer or device connected to the router (either via Wi-Fi or Ethernet), open a browser and try visiting a website (e.g., www.google.com) to confirm the router is successfully providing internet access.
* If the internet is not working, check the following:
  + Ensure all physical connections (router-to-modem and device-to-router) are secure.
  + Verify the router is receiving an IP address from your ISP in the **WAN status** page.
  + If necessary, restart the modem and router (unplug both devices for 30 seconds, then plug them back in).

#### 8. **Secure Your Network**

* Change the router’s default **admin** password to something more secure.
* Set up **firewall rules** and other security features if your router supports them.

Section 5:

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

🡪1. **Facilitates Troubleshooting and Problem Resolution**

2. **Enhances Security and Compliance**

3. **Aids in Network Planning and Expansion**

4. **Supports Disaster Recovery and Business Continuity**

5. **Improves Collaboration and Knowledge Sharing**

6. **Ensures Consistency in Network Configuration**

7. **Facilitates Compliance and Reporting**

8. **Optimizes Network Performance and Efficiency**

9. **Simplifies Vendor Management and Third-Party Support**