Module – 4 : Understanding and Maintenance of Networks

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

Reason : Router's main function is to determine best path for data to travel between different networks and forward data packets accordingly.

2. What is the purpose of DNS (Domain Name System) in a computer network?
   a) Encrypting data transmissions for security
   b) Assigning IP addresses to devices dynamically
   c) Converting domain names to IP addresses
   d) Routing data packets between network segments

Ans. c) Converting domain names to IP addresses

Reason : DNS translates human readable domain names into the numerical IP addresses.

3. What type of network topology uses a centralized hub or switch to connect all devices?
   a) Star
   b) Bus
   c) Ring
   d) Mesh

Ans. a) Star

Reason : In star topology, all devices are connected to a central hub or switch, which acts as main point for data transmission.

4. Which network protocol is commonly used for securely accessing and transferring files over a network?
   a) HTTP
   b) FTP
   c) SMTP
   d) POP3

Ans. b) FTP

Reason : For securely accessing and transferring files, more precise protocol is SFTP.

5. 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

Reason : Firewall acts as a gatekeeper which is checking all incoming and outgoing traffic against security rule and blocking traffic which doesn't meet condition.

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

Ans. False

Reason : DHCP automatically assigns Dynamic IP addresses to devices not Static IP, so users can join the network without manual configuration.

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

Ans. True

Reason : VLANs split one physical network into multiple logical networks, improves security, reducing congestion and allows better management without extra cables.

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

Ans. Difference :

- Hub is a physical layer device and Switch is a data link layer device.
- Hub broadcasts data to all ports whereas Switch sends data to only destination port.
- Hub has more collisions whereas Switch reduces collisions.
- Low security in Hub, but Switch has higher security.

9. Describe the process of troubleshooting network connectivity issues.

Ans. **Steps :**

1) Make sure that all cables are connected proper, Wi-Fi is turned on and device is connected to correct network.

2) Check that problem is faced for only one device or in the entire network.
3) Make sure that device has valid ip address using commands like **ipconfig** or **ifconfig**.
4) Reboot the modem, router and affected devices to clear temporary issues.
5) Check router's interface to confirm internet connection status and look for error messages.
6) If the local network is fine than contact internet service provider.
7) Review DNS settings, firewall configurations, or replace faulty hardware if necessary.

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

Ans. **Steps :**

1) Access the router's admin page by entering its IP address in browser and logging in.
2) Change the default admin username and password to strong.
3) Set Wi-Fi security to WPA3 or WPA2-PSK with a long, complex passphrase.
4) Rename SSID without revealing personal information.
5) Disable WPS to prevent exploitation of known vulnerabilities.
6) Enable router's built in firewall with extra protection.
7) Update router's firmware to update the latest version for security patches.
8) Enable MAC address filtering to allow only known devices.

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

Ans. **Importance of Network Documentation :**

- It is a detailed record of network's design, configuration, and operational procedures.
- It helps with troubleshooting, maintenance, security management and future upgrades.
- Proper documentation ensures that network admins can quickly identify problems, train new staff and maintain consistent configurations.
- Reduces downtime by providing a clear reference during changes.

Example of Information :

1) Visual maps of network topology that how devices are connected.

2) List of static and dynamic IP addresses in use.
3) Details of routers, switch, servers and workstations including model and serial numbers.
4) Current settings for routers, firewall and switches.
5) Securely stored admin usernames and passwords.
6) Location and labeling of network cables and ports.
7) Contact details for Service Providers and Hardware Vendors.
8) Record of all network changes, updates or replacements.