**ASSIGNMENT – 3:**

**Understanding and Maintenance Of Networks**

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| **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**

**Answer: (c)** Forwarding data packets between networks

**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**

**Answer: (c)** Converting domain names to 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**

**Answer: (a)** Star

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

**a) HTTP**

**b) FTP**

**c) SMTP**

**d) POP3**

**Answer: (b)** FTP

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| **SECTION 2: TRUE OR FALSE** |

**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.**

**Answer:** True

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

**Answer:** False

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

**Answer:** True

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| **SECTION 3: SHORT ANSWER** |

**8.** **Explain the difference between a Hub and a Switch in a computer network.**

* **Answer:**

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| **HUB** | **SWITCH** |
| * Hub is Broadcast Device. * Hub operates at physical layer (Layer 1) of OSI model. * Hub works in half duplex. * Hub does not store any address. | * Switch is Multicast Device. * Switch operates at data link layer (Layer 2) of OSI model. * Switch works in full duplex. * Switch store MAC address |

**9.** **Describe the process of troubleshooting network connectivity issues.**

* **Answer:**
  + Identify the issue: Observe symptoms, gather information from users, and determine the affected devices.
  + Check physical connections: Inspect cables, ports, and devices for damage or loose connections.
  + Basic network commands: Use "ping" to test connectivity, "tracert" to track packet path, and "ipconfig" to view network configuration.
  + DNS check: Verify if the device can resolve domain names to IP addresses.
  + Device restart: Reboot affected devices like routers and computers.
  + Advanced diagnostics: Utilize tools like "netstat" to analyze network connections and "ifconfig" to check network interface details.
  + Contact ISP: If the issue is beyond local network, contact your internet service provider.

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| **SECTION 4: PRACTICAL APPLICATION** |

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

* **Answer:**

**1. Access Router Settings:**

* + Open a web browser and enter your router's IP address (usually found on a sticker on the router itself).
  + Login using the default username and password (which you should change immediately).

**2. Basic Security Settings:**

* + **Change Default Credentials:**
  + Modify the router's login username and password to a strong and unique combination.
  + **Update Firmware:**
  + Check for and install the latest firmware update available for your router.

**3. Wireless Network Settings:**

* + **Encryption Mode:**
  + Select "WPA3 Personal" as your encryption standard for the most secure option.
  + If WPA3 is not available, choose WPA2-PSK (AES).
  + **Network Name (SSID):**
  + Consider hiding your network SSID (disable SSID broadcast) to prevent unauthorized devices from easily detecting your network.
  + **Password:**
  + Create a strong password with a mix of uppercase and lowercase letters, numbers, and symbols.

**4. Advanced Security Features:**

* + **Disable WPS (Wi-Fi Protected Setup):**
  + This feature can be easily exploited, so disable it.
  + **Guest Network:**
  + Create a separate guest network with limited access for visitors, preventing them from accessing your private network.
  + **Firewall:**
  + Ensure your router's built-in firewall is enabled and configured to block unwanted traffic.
  + **Access Control:**
  + If available, set up MAC address filtering to only allow specific devices to connect to your network.

**5. Other Important Considerations:**

* + **Regular Monitoring:** Regularly check your router's logs for suspicious activity.
  + **Device Security:** Ensure all connected devices have their own security measures in place, including strong passwords and up-to-date software.
  + **Device Management:** Limit the number of devices connected to your network and manage which devices have access to specific features.

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| **SECTION 5: ESSAY** |

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

* **Answer:**
  + **Facilitates Troubleshooting:**
  + Provides quick access to configuration details during network outages or issues, reducing downtime.
  + **Supports Network Maintenance:**
  + Simplifies routine maintenance tasks, such as upgrading devices or reconfiguring settings.
  + **Enables Scalability:**
  + Helps plan and execute network expansions by providing a clear view of the existing infrastructure.
  + **Enhances Security:**
  + Ensures that security protocols and configurations are consistently documented and can be reviewed for vulnerabilities.
  + **Knowledge sharing:**
  + Documentation can help improve collaboration and innovation.
  + **Examples of Information to Document :**
    - **Network Topology:**
    - Diagrams showing the physical and logical structure of the network, including connections between devices.
    - **Device Inventory:**
    - List of all network devices (e.g., routers, switches, servers, access points) with details like:
    - Device name
    - Model and serial number
    - IP address
    - MAC address
    - Location
    - **IP Addressing Scheme:**
    - Documentation of IP address assignments (static and dynamic), including subnet masks and gateway addresses.
    - **Network Configuration:**
    - Configuration details for routers, switches, firewalls, and other devices:
    - VLAN configurations
    - Routing protocols (e.g., OSPF, BGP)
    - NAT and firewall rules
    - **Security Settings:**
    - Password policies, encryption methods, and access control lists (ACLs).
    - Details of VPNs, firewalls, and intrusion detection/prevention systems.
    - **Wireless Network Details:**
    - SSIDs, encryption types (WPA2/WPA3), and Wi-Fi passwords.
    - Coverage maps and access point placement.
    - **Network Services:**
    - Details of DHCP, DNS, and other critical services, including server IPs and configurations.
    - **Contact Information:**
    - List of vendors, service providers, and key personnel responsible for network maintenance and support.
    - **Backup and Recovery Procedures:**
    - Steps for backing up configurations and restoring the network after a failure.