**Module 8: Networking**

**1. Explain Switch**

* A **switch** is a network device that operates at Layer 2 (Data Link Layer) of the OSI model. It connects devices within a Local Area Network (LAN) and forwards data frames based on MAC addresses. Unlike a hub, a switch reduces collisions and traffic by sending data only to the specific device that needs it.

**2. Explain Switch Boot Sequence**

* The **switch boot sequence** generally follows these steps:
  1. **Power-On Self-Test (POST)**: The switch checks its hardware components for proper functionality.
  2. **Load Bootstrap**: The switch loads the bootstrap program from flash memory.
  3. **Load the IOS (Internetwork Operating System)**: The switch loads the Cisco IOS software from flash memory.
  4. **Load the Configuration File**: The switch loads its startup configuration from NVRAM or from a TFTP server if configured.
  5. **Operate Normally**: The switch is now ready to forward data.

**3. Explain Three Methods to Access Switch Command Line Interface (CLI)**

* **Console Port**: Connect a computer directly to the switch using a rollover cable and access the CLI using terminal emulation software like PuTTY or HyperTerminal.
* **Telnet**: Connect to the switch remotely over the network by using Telnet (requires an IP address on the switch).
* **SSH (Secure Shell)**: A secure method to access the CLI remotely over the network using encrypted communication.

**4. Explain and Configuring the Cisco Internet Operating System (IOS)**

* **Cisco IOS** is the operating system used in Cisco routers and switches. It provides a command-line interface (CLI) for configuration and management of network devices. Configuration involves commands for setting up routing protocols, interfaces, VLANs, security settings, and more. Common configuration commands include interface, ip address, hostname, and enable secret.

**5. Explain Switch Port**

* A **switch port** is a physical interface on a switch where network devices are connected. Switch ports can be configured for different purposes:
  + **Access Port**: Typically used to connect end devices such as computers.
  + **Trunk Port**: Used to connect switches together and allow multiple VLANs to pass over the same physical link.
  + **PoE (Power over Ethernet) Port**: Provides both power and data over the same Ethernet cable to devices like IP phones.

**6. R1, R2, R3, and R4 have their Fast Ethernet 0/0 interfaces attached to the same VLAN. A network engineer has typed a configuration for each router by using a word processor. He will later copy and paste the configuration into the routers. Examine the following exhibit, which lists configuration for the four routers, as typed by the network engineer. Assuming that all four routers can ping each other’s LAN IP addresses after the configuration has been applied, choose the routers that will be able to form a neighbor relationship with the other routers on the LAN.**

* **Answer**: **B. R2** and **C. R3**
* Explanation: In OSPF (Open Shortest Path First), routers can only form neighbor relationships if they are on the same network segment and have matching OSPF parameters (e.g., hello/dead intervals, area IDs, etc.). Based on the scenario, R2 and R3 are the routers that will be able to form a neighbor relationship.

**7. "3-enable secret [password] is hashed using the algorithm."**

* **Answer**: **A. MD5**
* Explanation: The enable secret password in Cisco devices is hashed using **MD5** (Message Digest 5) for security purposes, making it more secure than the enable password.

**8. An engineer connects to Router R1 and issues a show ip ospf neighbor command. The status of neighbor 2.2.2.2 lists FULL/BDR. What does the BDR mean?**

* **Answer**: **B. R1 is a backup designated router.**
* Explanation: In OSPF, **BDR** stands for **Backup Designated Router**. This means that Router R1 is a backup router in the event that the current **DR (Designated Router)** fails.

**9. Which command is used to view the neighbor discovery table on a PC?**

* **Answer**: **C. netsh interface ipv6 show neighbor**
* Explanation: This command is used in Windows PCs to display the neighbor discovery table for IPv6, which shows devices on the local network.

**10. What type of variable is being shown? Routers = [R1, R2, R3]**

* **Answer**: **A. List**
* Explanation: The variable Routers is a **list** containing multiple values (R1, R2, R3). Lists are ordered collections of items.

**11. Identify the fields in an IPv4 header. (Choose three)**

* **Answer**:
  + **B. Time to Live**
  + **C. Source address**
  + **D. Destination address**
* Explanation: The **IPv4 header** contains several fields, including:
  + **Time to Live (TTL)**: Limits the lifespan of a packet.
  + **Source Address**: IP address of the sender.
  + **Destination Address**: IP address of the receiver.