CYBERSECURITY TRAINING

(WEEK 1-Day5)

1.Networking Fundamentals

1.1. Basics of Computer Networks and Network Topologies

- **Computer Network**: A group of interconnected devices that can communicate and share resources.
- **Types**: LAN (Local Area Network), WAN (Wide Area Network), MAN (Metropolitan Area Network), PAN (Personal Area Network).

Network Topologies:

- **Bus**: All devices connected to a single cable. (Simple but not scalable)

- **Star**: All devices connect to a central hub/switch. (Common in LANs)
- **Ring**: Devices connected in a circular manner. (Each has two neighbors)
- **Mesh**: Every device connects to every other. (High redundancy)
- **Hybrid**: Combination of two or more topologies.

1.2. TCP/IP Protocol Suite and OSI Model

TCP/IP Model (4 Layers):

1. Application (HTTP, FTP, DNS)
2. Transport (TCP, UDP)
3. Internet (IP, ICMP)
4. Network Access (Ethernet, Wi-Fi)

OSI Model (7 Layers):

1. Application

2. Presentation
3. Session
4. Transport
5. Network
6. Data Link
7. Physical

1.3. IP Addressing and Subnetting

- **IP Address**: A unique numerical label assigned to each device on a network.
  - **IPv4**: 32-bit address (e.g., 192.168.1.1)
  - **IPv6**: 128-bit address (e.g., 2001:0db8:85a3::8a2e:0370:7334)
- **Subnetting**: Dividing a network into smaller sub-networks to improve performance and security.

- Uses **subnet masks** (e.g., /24 = 255.255.255.0).

1.4. Introduction to Network Devices

Routers

- Connect multiple networks.
- Forward data based on IP addresses.
- Enable internet access and routing.

Switches

- Connect devices within a LAN.
- Forward data using **MAC addresses**.
- More efficient than hubs.

Firewalls

- Monitor and control incoming/outgoing traffic.
- Protect networks from unauthorized access and threats.