Assignment 2

Data Communications

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Q1: Different types of networks

1. **PAN (Personal Area Network)**: Short-range (e.g., Bluetooth).
2. **LAN (Local Area Network)**: Small geographic area (e.g., office network).
3. **MAN (Metropolitan Area Network)**: Covers a city (e.g., city-wide Wi-Fi).
4. **WAN (Wide Area Network)**: Large geographic area (e.g., the internet).
5. **WLAN (Wireless LAN)**: LAN using wireless tech (e.g., Wi-Fi).

Q2: STP vs. UTP

Shielded Twisted Pair (STP)	Unshielded Twisted Pair (UTP)
Has a metallic shield to reduce interference	No shielding, more prone to interference
Expensive and bulky	Cheaper and flexible
Used in industrial environments	Common in Ethernet cables (e.g., Cat5e, Cat6)

Q3: Baseband vs. Broadband Transmission

Baseband	Broadband
Single signal at a time	Multiple signals simultaneously
Uses entire bandwidth	Divides bandwidth into channels
Short-distance (e.g., Ethernet)	Long-distance (e.g., cable TV, DSL)

Q4: Hub vs. Modem vs. Router vs. Switch

Device	Function
Hub	Broadcasts data to all connected devices (dumb device).
Modem	Modulates/demodulates signals for internet access (e.g., DSL modem).
Router	Routes data between networks (e.g., connects LAN to WAN).
Switch	Sends data only to the intended device (smarter than a hub).

Q5: MAC Address Transfer

No, the **MAC address** is hardcoded into the **NIC (Network Interface Card)** and remains tied to the physical hardware. Moving the NIC transfers the MAC address to the new PC.

Q6: Common Hardware Network Problems

- Faulty cables (e.g., cuts, bends).
- NIC failures.
- Router/modem power issues.
- IP address conflicts.
- Wireless interference (e.g., walls, other devices).

Q7: Anti-virus Installation

Install anti-virus on **both servers and all workstations**. Servers protect shared resources, while workstations prevent entry points for malware.

Q8: Static IP vs. Dynamic IP | IPv4 vs. IPv6

Static IP	Dynamic IP
Manually assigned, doesn't change	Automatically assigned (e.g., via DHCP), changes periodically
Used for servers, printers	Common for home devices
IPv4	IPv6
32-bit address (e.g., 192.168.1.1)	128-bit address (e.g., 2001:0db8:85a3::8a2e:0370:7334)
Limited addresses (~4.3 billion)	Virtually unlimited addresses

Q9: TCP/IP Model Layers

1. **Application Layer**: HTTP, FTP, SMTP (user-facing apps).
2. **Transport Layer**: TCP (reliable), UDP (fast).
3. **Internet Layer**: IP (routing packets).
4. **Network Access Layer**: Physical connections (e.g., Ethernet).

Q10: Web Browser Examples

A **web browser** retrieves and displays web pages (e.g., Chrome, Firefox, Edge, Safari).

Q11: Search Engine Examples

A **search engine** indexes and finds web content (e.g., Google, Bing, DuckDuckGo).

Q12: Internet vs. WWW | Uses

- **Internet**: Global network of interconnected computers.
- **WWW (World Wide Web)**: Information system accessed via the internet (uses HTTP).
- **Daily Uses**: Communication (email, social media), education, banking, entertainment.

Q13: ISP Examples in India

Internet Service Providers offer internet access (e.g., Airtel, Jio, BSNL, ACT Fibernet).

Q14: MAC vs. IP vs. Port Address

MAC Address	IP Address	Port Address
Physical hardware ID (e.g., 00:1A:2B:3C:4D)	Logical network ID (e.g., 192.168.1.1)	Identifies specific services (e.g., port 80 for HTTP)
Layer 2 (Data Link)	Layer 3 (Network)	Layer 4 (Transport)

Q15: View Browser History

- **Chrome**: `Ctrl+H` → View/search history.
- **Firefox**: `Library` → `History`.
- **Edge**: `Hub icon` → `History`.