Part IV: Network Tools

Q-4:

1)

a) Protocols -

i) QUIC (Quick UDP Internet Connections)

- Used to reduce latency compared to that of TCP.
- It is a Transport layer protocol.
- RFC Number - RFC 9000

ii) Dynamic Host Configuration Protocol (DHCP)

- DHCP is a network management protocol used on Internet Protocol (IP) networks for automatically assigning IP addresses and other communication parameters to devices connected to the network using a client–server architecture.
- DHCP operates at the Application layer.
- RFC Number - RFC 2131

iii) SSDP (Simple Service Discovery Protocol)

- Used to stream video from the source to playback system.
- It is a transport layer protocol.

iv) ARP (Address Resolution Protocol)

- used to map MAC addresses to IP addresses
- It is a Data link layer Protocol
- RFC Number - RFC 826

v) MDNS (Multicast DNS)

- Used to resolve the hostname to IP address
- MDNS operates at the Network layer.
- RFC Number - RFC 5246

vi) Network Time Protocol (NTP)

- NTP is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.
- NTP operates at the Application layer.
- RFC Number - RFC 5905

b) Connection => TCP

- Time of sending packet = 2.000560021
- Time of response = 2.094706604
- RTT = 2.094706604 - 2.000560021
  = 0.094146583 s = **94.146583 ms**

2)

HTTP (Hypertext Transfer Protocol):

Versions: HTTP/1.0, HTTP/1.1, HTTP/2, HTTP/3 (the latest).
GitHub: GitHub uses HTTP/2, which is optimized for faster loading of web pages and resources.
Netflix: Netflix uses HTTP/1.1 and HTTPS for secure communication to stream content.
Google: Google uses a mix of HTTP/1.1 and HTTP/2, with a focus on optimizing page load times.

HTTPS (HTTP Secure):

HTTPS is not a separate protocol but rather a secure version of HTTP. It uses SSL/TLS to encrypt data between the client and the server.

All three websites mentioned (GitHub, Netflix, and Google) use HTTPS to ensure secure communication and data privacy.

WebSocket:

WebSocket is a protocol that provides full-duplex communication channels over a single TCP connection.

WebSocket is used for real-time interactive features like chat or notifications on various websites, but its usage can be application-specific.

QUIC (Quick UDP Internet Connections):

QUIC is an emerging transport layer protocol developed by Google that runs on top of UDP.

Google services, including search and YouTube, have been early adopters of QUIC to improve web performance and security.

*Differences and Similarities:

HTTP/HTTPS: All three websites use HTTP/HTTPS for serving web pages and resources. HTTP/2 and HTTP/3 (used by GitHub) are improvements over HTTP/1.1 in terms of speed and efficiency.

WebSocket: WebSocket is typically used for real-time communication on websites and is not a replacement for HTTP/HTTPS. It complements these protocols for specific use cases.

QUIC: Google services use QUIC as an alternative transport layer protocol to enhance performance and security, but it operates at a lower level than HTTP/HTTPS.

Security: All three websites prioritize security by using HTTPS, which encrypts data in transit to protect user privacy.

3) List of cookies of eoffice.iitgn.ac.in –

PHPSESSID (Session Cookie)
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