## Theory Assignment No. 1

Q.1 Compare and Contrast the OSI and TCP/IP Network Models.

Q.2 Explain the various Network Topologies and Transmission Modes, and how they influence the design and performance of different Types of Networks (LAN, WAN, MAN).

## Theory Assignment No. 2

Q.1 Describe the evolution of Ethernet technologies, comparing and contrasting their key characteristics, and explain how Wireless LANs differ in their operational principles at the Data Link Layer.

Q.2 Explain the significance of Error Detection and Correction at the Data Link Layer, detailing various techniques and the mechanisms of Automatic Repeat Request (ARQ) protocols.

## Theory Assignment No. 3

Q.1 Compare and contrast the functions and operational principles of various Network Devices (Hub, Switch, Router, Bridge, Gateway, Repeater, Modem) in a networked environment, highlighting their respective OSI layer of operation.

Q.2 Explain the significance of IP Addressing and Subnetting in the Network Layer, detailing the transition from IPv4 to IPv6, and the role of ARP in supporting IP communication

## Practical Assignment No. 1

Q. 1 Write a program for print the IP Address of a WWW.YAHOO.COM

Q. 2. Write a program for to print the IP Address of the local machine and hostname.

Q. 3. Write HTML program to implement get( ) and post( ) methods

## Practical Assignment No. 2

Q. 1. Write a program for to identify the well known ports on a Remote system.

Q. 2. Write a program for to print the parts of URL.

Q. 3. Write a program for to send & receive data from datagram packet.

## Question Bank of Practicals

**I. Network Configuration & Information**

- **Local IP Configuration:**
    - **Task:** Open Command Prompt (Windows) or Terminal (Linux/macOS). Run ipconfig (Windows) or ifconfig/ip addr (Linux/macOS).
    - **Question:** What are your computer's IP address, subnet mask, and default gateway? What role do these three play in network communication?
- **DNS Resolution:**
    - **Task:** In the command prompt/terminal, run nslookup google.com (Windows) or dig google.com (Linux/macOS).
    - **Question:** What is the IP address of google.com? What is the IP address of the DNS server being used by your system? Why is DNS resolution important?
- **Network Connections and Ports:**
    - **Task:** In the command prompt/terminal, run netstat -an.
    - **Question:** Which protocols (TCP/UDP) are visible in the netstat output? What do "LISTENING" and "ESTABLISHED" statuses mean? Give three examples where port numbers 80, 443, or 22 are being used.

**II. Connectivity & Reachability**

- **Basic Connectivity Test (Ping):**
    - **Task:** In the command prompt/terminal, run ping google.com and ping 127.0.0.1.
    - **Question:** What does the ping command test? What information (like RTT) do you get when you ping google.com? What is the purpose of pinging 127.0.0.1?
- **Network Path Tracing (Traceroute):**
    - **Task:** In the command prompt/terminal, run tracert google.com (Windows) or traceroute google.com (Linux/macOS).
    - **Question:** Through which routers do packets pass to reach Google's server? How much time (in milliseconds) does it take to reach each router?

**III. Port Scanning & Services**

- **Open Ports on Local Machine:**
    - **Task:** Use telnet 127.0.0.1 80 (if a web server is running on your system) or nmap 127.0.0.1 (if nmap is installed).
    - **Question:** Which ports are open on your localhost (127.0.0.1) and to which services might they be related? (Example: Port 80 for HTTP, Port 443 for HTTPS).
- **Checking Service Availability:**
    - **Task:** Check connectivity to port 80 for a common web server (e.g., example.com): telnet example.com 80. If connected, type GET / HTTP/1.1 and press Enter twice.
    - **Question:** How can you confirm that a web server is responding on port 80 using

this command? What response do you receive?

**IV. Network Sharing & Protocols**

- **File Sharing (SMB/NFS) Practice:**
    - **Task:** Share a folder in your operating system (e.g., 'Network Sharing' on Windows or Samba/NFS on Linux). Attempt to access that shared folder from another computer (or virtual machine).
    - **Question:** Which protocols are used for file sharing (SMB in Windows, NFS in Linux)? What permissions did you have to configure for sharing?
- **HTTP Server and Client Interaction:**
    - **Task:** Run a simple HTTP server (like the Python example previously provided). Navigate to http://127.0.0.1:8000 from your browser.
    - **Question:** What function does an HTTP server perform? What HTTP request and response occur between the browser and the server when you enter a URL? (You can also confirm this using Wireshark).
- **Using FTP (File Transfer Protocol):**
    - **Task:** Attempt to connect to a public FTP server (e.g., ftp ftp.mozilla.org) or set up a local FTP server. Try uploading/downloading files.
    - **Question:** What is FTP and how does it work for file transfers? What do "control connection" and "data connection" mean in FTP?

**V. Basic Security & Troubleshooting**

- **Impact of Firewall:**
    - **Task:** Disable your computer's firewall and then run ping google.com. Re-enable the firewall and create some inbound and outbound rules (e.g., blocking a specific port).
    - **Question:** What is the impact on network connectivity when disabling the firewall and applying rules? What role does a firewall play in network security?
- **Importance of Loopback Address:**
    - **Task:** Run ping 127.0.0.1.
    - **Question:** What is the loopback address (127.0.0.1) and why is it used? Does it work without being connected to a network?
- **Unplugging Network Cable:**
    - **Task:** If using a wired connection, unplug the network cable and run ping google.com and ipconfig/ifconfig.
    - **Question:** What is the output of the ping command after unplugging the cable? What changes do you observe in the ipconfig/ifconfig output? What does this indicate?

- **DHCP (Dynamic Host Configuration Protocol):**
    - **Task:** Check your network adapter settings to see if it's obtaining an IP address automatically (DHCP).
    - **Question:** What is DHCP? How does it provide IP addresses to devices on a network? What is the advantage of DHCP over manual IP configuration?
- **Different Types of Network Cables:**
    - **Task:** Identify different types of network cables (like Ethernet, Fiber Optic, Coaxial) by looking at images or videos.
    - **Question:** Name three different types of network cables and where each is commonly used. What are their main advantages and disadvantages?

## Unit -1:Introduction to Network

## Question Bank

- What is the fundamental definition of a computer network, and name three distinct real-world applications where networks are essential?
- Explain the difference between a point-to-point and a multipoint line configuration in a network.
- Draw and briefly explain the characteristics of any two common network topologies (e.g., Star, Bus, Ring, Mesh). What is one advantage of each?
- Describe the three primary transmission modes: Simplex, Half-Duplex, and Full-Duplex. Provide a simple example for each.
- Compare and contrast LAN, MAN, and WAN in terms of their geographical coverage and typical ownership/management.
- What is a network protocol, and why are protocols crucial for effective communication between different devices in a network?
- List all seven layers of the OSI model in correct order, from Layer 1 to Layer 7.
- Briefly describe the primary function of the Data Link Layer (Layer 2) in the OSI model.
- Name the four layers of the TCP/IP Protocol Suite.
- Identify one key similarity and one key difference between the OSI model and the TCP/IP Protocol Suite.
- Distinguish between an Analog signal and a Digital signal, providing a characteristic feature

of each.

- Name three types of guided transmission media used in networks and briefly describe one characteristic of each.
- Name two types of unguided (wireless) transmission media. How do they transmit data?
- Ethernet is a dominant LAN technology. Which IEEE standard defines Ethernet, and what is a primary reason for its widespread use?
- In Ethernet, how does the CSMA/CD access method help manage data collisions on the network?

## Unit – 2: Network LAN Technologies

## Question Bank

- How does Gigabit Ethernet differ from Fast Ethernet in terms of maximum data transfer speed?
- List the three common wired Ethernet technologies mentioned and state their typical speed progressions.
- What is the primary advantage of a Wireless LAN (WLAN) over a traditional wired Ethernet LAN in terms of physical connectivity?
- What is the main role or responsibility of the Data Link Layer in the OSI model, particularly concerning data frames?
- Explain the difference between a "single-bit error" and a "burst error" during data transmission.
- Why is error detection crucial in data communication?
- Name one common method used for error detection in data transmission. (e.g., Parity Check, CRC)
- What is the main goal of "error correction" in data link layer protocols?
- What does ARQ stand for, and what is its general purpose in data link protocols?
- Describe the basic mechanism of the Stop-and-Wait ARQ protocol. What happens after a sender transmits a frame?
- In Go-Back-N ARQ, what is the significance of the "window size" for the sender?

- Which ARQ protocol (Stop-and-Wait or Go-Back-N) is generally considered more efficient for continuous data flow, and why?
- What action does an ARQ protocol take if it determines that a transmitted data frame was corrupted or lost?
- Name one significant challenge or characteristic unique to Wireless LANs that the Data Link Layer must address (e.g., interference, security, shared medium).
- Briefly distinguish between "retransmission" (as used in ARQ) and "forward error correction" as methods for handling errors in data communication.

## Bachelor of Technology (Computer Science and Engineering)
## Semester-V

## CSE190TR1 : Computer Network

**UNIT I: Introduction to Network** **9 Hours**

Definition, Applications, line configuration, Network topologies, Transmission mode, Types of Networks (LAN, WAN, MAN), Protocols,Network models: The OSI model, TCP/IP Protocol Suite. Physical Layer: Signals –Analog signals, Digital signals, Transmission media - Guided & Un- Guided.

**UNIT II: Network LAN Technologies** **9 Hours**

Network LAN Technologies: Ethernet, Fast Ethernet, Gigabit Ethernet, and Wireless LAN's Data Link Layer: Error Detection and correction - Types of Errors, Error Detection, Error correction. Data link Protocols – Stop-and-wait ARQ, Go-back-n ARQ, Automatic Repeat Request (ARQ).

**UNIT III: Network Devices:** **9**
**Hours** Network Devices: Modem, Hub, Switch, Router, Repeaters, bridges, Gateway Network Layer: Internetwork Protocol (IP), Addressing (Classes, Dotted-decimal notation, Sample Internet), Subnet mask, Network layer Protocols – ARP, IPv4, and IPv6.

**UNIT IV: Transport Layer** **9 Hours**

Transport Layer: TCP protocol, UDP protocol, Process-to-Process delivery, Congestion: Congestion control, congestion avoidance, congestion discarding, Quality of Service (QOS).

**UNIT V: Application Layer** **9 Hours**

Application Layer: Domain Name System (DNS) - domain name space, distribution of name space, DNS in the Internet, SMTP, SNMP, FTP, POP3, HTTP, WWW.

**Practical(s)**

1. Write a program for print the IP Address of a WWW.YAHOO.COM
2. Write a program for to print the IP Address of the local machine and hostname.
3. Write HTML program to implement get( ) and post( ) methods
4. Write a program for to identify the well known ports on a Remote system.
5. Write a program for to print the parts of URL.
6. Write a program for to send & receive data from datagram packet.
7. Write a program for a chat application.
8. Write a program for the simple file transfer between two systems by opening socket connection to out server on one system and sending a file from one system to another.
9. Write a program for the HTTP server.
10. Implement the concept of static routing.
11. Implement the concept of dynamic routing (RIP, OSPF, BGP).
12. Packet capture and header analysis by wire-shark (TCP,UDP,IP)