

Assignment : 1

1). Difference between TCP / IP and OSI layers.

TCP / IP	OSI
→ TCP / IP has 4 layers.	→ OSI has 7 layers.
→ The TCP / IP header size is 20 bytes.	→ The OSI header is of 5 bytes.
→ The TCP / IP refers to Transmission Control Protocol / Internet protocol.	→ The OSI refers to Open System Interconnection
→ The TCP / IP helps the user to determine how a specific computer should be connected to the internet. and how data can be transmitted between them.	→ The OSI model is a logical and conceptual model that defines network communication used by systems open to interconnection and communication with other system.
→ The TCP / IP follows a horizontal approach.	→ The OSI follows a vertical approach.

2) Explain OSI layers in detail.

1) Physical Layer :

- The lowest layer of the OSI model is concerned with electrically or optically transmitting raw unstructured data bits across the network from the physical layer of the sending device to the physical layer of the receiving device.
- It can include specifications such as voltages, pin layout, cabling and radio frequencies.
- At the physical layer, one might find physical resources such as network hubs, cabling, repeaters, network adapters or modems.

2) Data Link Layer

- At the data link layer, directly connected nodes are used to perform node to node data transfer where data is packaged into frames.
- The data link layer also corrects

errors that may have occurred at the physical layer.

- The data link layer encompasses two sub-layers of its own. The first, media access control (MAC), provides flow control and multiplexing for device transmission over a network.
- The second, the logical link control (LLC), provides flow and error control over the physical medium as well as identifies line protocols.

3) Network Layer.

- The network layer is responsible for receiving frames from the data link layer and delivering them to their intended destinations among several on the addresses contained inside the frame.
- The network layer finds the destination by using logical addresses such as IP (internet protocol). At this layer, routers are a crucial component used to quite literally route information where it needs to go between networks.

4) Transport Layer.

- The transport layer manages the delivery and error checking of data packets. It regulates the size, sequencing, and ultimately the transfer of data between systems and hosts.
- One of the most common examples of the transport layer is TCP or the Transmission Control Protocol.

5) Session Layer.

- The session layer controls the conversations between different computers.
- A session or connection between machines is set up, managed, and terminated at layer 5.
- Session layer services also include authentication and reconnection.

6) Presentation Layer

- The presentation layer formats or translates data for the application layer based on the syntax or semantics that the application accepts.
- Because of this, it at times also called the syntax layer. This layer can also handle the encryption and decryption required by the application layer.

7) Application Layer

- At this layer, both the end user and the application layer interact directly with the software application.
- This layer sees network services provided to end-user applications such as a web browser or office 365.
- The application layer ~~delivers~~ identifies communication patterns, resource availability and synchronize communication.

20DCS103

3) What is Analog signal and Digital signal?

→ Analog signal :-

Analog signal is a continuous wave form that changes smoothly over time.

→ Digital signal :-

Digital signal is discrete which has limited number of defined values.

4) Describe the three characteristics of a sine wave.

* 1) Amplitude :-

The amplitude is the value of a sine wave at any point on the sine wave form.

* 2) Frequency :-

The frequency of a signal is the number of cycles per second.

* 3) Phase :-

The phase describes the position of a waveform relative to time zero.

5) Define protocol :-

- In networking, a protocol is a set of rules for formatting and processing data.
- Standardized protocols are like a common language that computers can use, similar to how two people from different parts of the world may not understand each other's native languages, but they can communicate using a shared third language.
- If one computer uses the internet protocol and second computer does as well, they will be able to communicate just as the United Nations relies on its 6 official languages to communicate amongst representatives from all over the globe.
- But if one computer uses the IP and the other does not know this protocol, they will be unable to communicate.
- On the internet, there are different protocols for different types of processes.

→ Protocols are often discussed in terms of which OSI model layer they belong to.

6) Explain Topology in detail.

→ Network topology refers to the manner in which the links and nodes of a network are arranged to relate to each other.

① → Physical network topology :-

→ It is a physical signed transmission medium.

→ Ex :- star, mesh, tree, ring, point -to- point, circular, hybrid and bus topology.

② → Logical network topology :-

→ It refers to the manner in which data travels through the network between devices, regardless of the physical connection of the devices.

→ Ex :- twisted pair Ethernet, token ring.

* Physical Network Topology :-

1) Bus network topology :-

- This configuration connects all the devices to a main cable via drop lines.
- The advantages of bus network topology lie in its simplicity as there is less cable required than in alternative technologies, which makes for easy installation.

2) Mesh network topology :-

- A dedicated point-to-point link connects each device on the network to another device on the network, only carrying data between two devices.

3) Ring network topology :-

- Two dedicated point-to-point links connect a device to the two devices located on either side of it, creating a ring of devices through which data is forwarded via repeaters until it reaches the target device.

- 4) Star network topology :
- The most common network topology, star topology connects each device in the network to a central hub.
 - Devices can only communicate with each other indirectly through the central hub.

5) Hybrid network topology :

- Any combination of two or more topologies is a hybrid topology.

6) Tree network topology :

- This topology consists of a parent-child hierarchy in which star networks are interconnected via bus networks.
- Nodes branch out linearly from one root node, and two connected nodes only share one mutual connection.

20 DCS103

7) Explain three modes of communication in detail.

* 1) Simplex

- In simplex transmission mode, the communication between sender and receiver occurs in only one direction.
- The sender can only send the data and the receiver can only receive the data. The receiver cannot reply to the sender.

* 2) Half Duplex

- In half duplex transmission mode, the communication between sender and receiver occurs in both the directions.
- The sender and receiver both can send and receive the information, but only one is allowed to send at any given time.
- Ex:- walkie-talkies, etc.

* 3) Full Duplex

- In full duplex transmission mode, the communication between sender and receiver can both transmit and receive ~~at the same time~~ at the same time.
- Ex:- telephonic conversations, etc.

8). Give some examples of protocols that work at the application layer and transport layer.

→ Application layer protocol :-

TELNET : helps in terminal emulation

FTP : helps to transfer files.

TFTP : used to transfer files
(simplified version of FTP)

NFS : allows remote hosts to mount file systems over a network.

→ The transport layer is responsible for process to process delivery of the entire message.

→ The transport layer ensures that the whole message arrives intact and in order, overseeing both error control and flow control at the source to destination level.

→ Standard TCP / IP services (and SNMP (Simple Network Management Protocol) etc. are the examples of various layers.

20DCS103

Q) How data breaks down on each layer from top to bottom? Explain in detail.

→ The encapsulation occurs in the following format:

Application : To allow access to network resources.

Presentation : To translate, encrypt and compress data.

Session : To establish, manage and terminate sessions.

Transport : To provide reliable process to process message delivery and error recovery.

Network : To move packets from source to destination; to provide internetworking.

Datalink : To organize bits into frames; to provide hop to hop delivery.

Physical : To transmit bits over a medium ;
to provide mechanical and electrical specifications.

10) What is a spectrum of a signal ?

- The signal spectrum describes a signal's magnitude and phase characteristics as a function of frequency.
- It describes how the system changes signal magnitude and phase as a function of frequency.