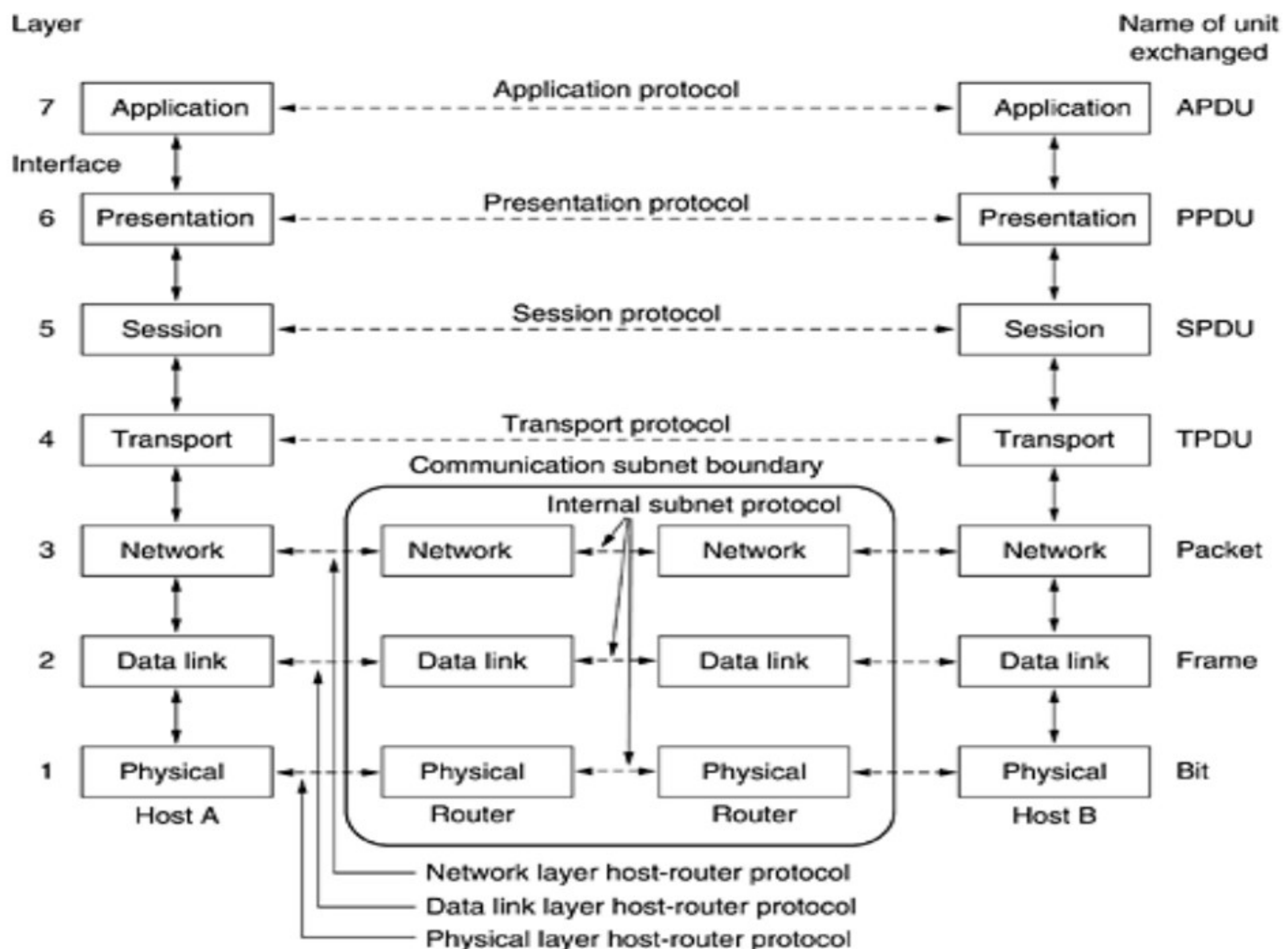


1. Explain OSI model in detail and also Explain the function of each layer.

- OSI is an Open System Interconnection reference model. It is a model for open networking system that was developed by ISO.
- This model is called ISO OSI reference model because it deals with connecting open system that is system that are open for communication with other system.
- OSI model is not a protocol. It's a model for understanding and designing a network architecture that is flexible, robust and interoperable.
- The OSI reference model has seven layers.
- Layer 1, 2 and 3 that is physical, data link and network layers are the **Network Support Layer**.
- Layer 5, 6 and 7 which is session, presentation and application layers is the **User Support Layer**.
- Transport layer links the network support layers and user support layers.



Physical Layer:-

- The physical layer is the bottom layer of OSI model.
- It is concern with transmitting raw bits over a physical medium.
- It defines the physical structure of network (physical topology).
- It defines mechanical and electrical specification for using medium.
- It defines Bit transmission, encoding and timing.

Datalink Layer:-

- A datalink layer specifies raw data bits are grouped into frames and specific frame format.
- It's responsible for error correction, flow control, hardware addressing and how devices such as hubs, bridges and switches operate at layer 2.
- It establishes and maintains the data link for the network layer above it.
- The datalink layer is divided into two sub layers

1) Logical Link Control Layer(LLC):-

- It's upper of the two layers.
- This establishes and maintains links between communicating devices.
- It is responsible for flow control, error detection & requesting for connection oriented communication but which also supports connection less communication.

2) Media Access Control Layer(MAC):-

- It's lower of the two layers.
- It is responsible for providing a method for station to gain access to the medium.

Network Layer:-

- The network layer is responsible for the source to destination delivery of a packet possibly across multiple networks.
- The network layer is responsible for,
 1. Logical addressing and routing packets over the network.
 2. Establishing and releasing connection and paths between two nodes on a network.
 3. Transferring data, generating and confirming receipts and resetting connection.
 4. It also supplies connection less and connection oriented services to the transport layer above it.

Transport Layer:-

- Transport layer is responsible for source to destination delivery of the entire message.
- It can implement procedure to ensure the reliable delivery of message to their destination devices, means that if error occurs they are detected.
- The services of transport layer includes,
 1. Flow control to ensure that the transmitting device does not send more data than the receiving device can handle.
 2. Packet sequencing for segmentation of data packets and remote assembly.
 3. Error handling and acknowledgement to ensure that data is retransmitted when required.
 4. Multiplexing for compiling data from several sources for transmission over one data path.
 5. Virtual circuits or establishing sessions between communication devices.

Session Layer:-

- It defines how connection can be established, maintained and terminated.

- It is responsible for synchronizing data exchange between computers, structuring communication sessions and other issues directly related to conservations between network computers.

Presentation Layer:-

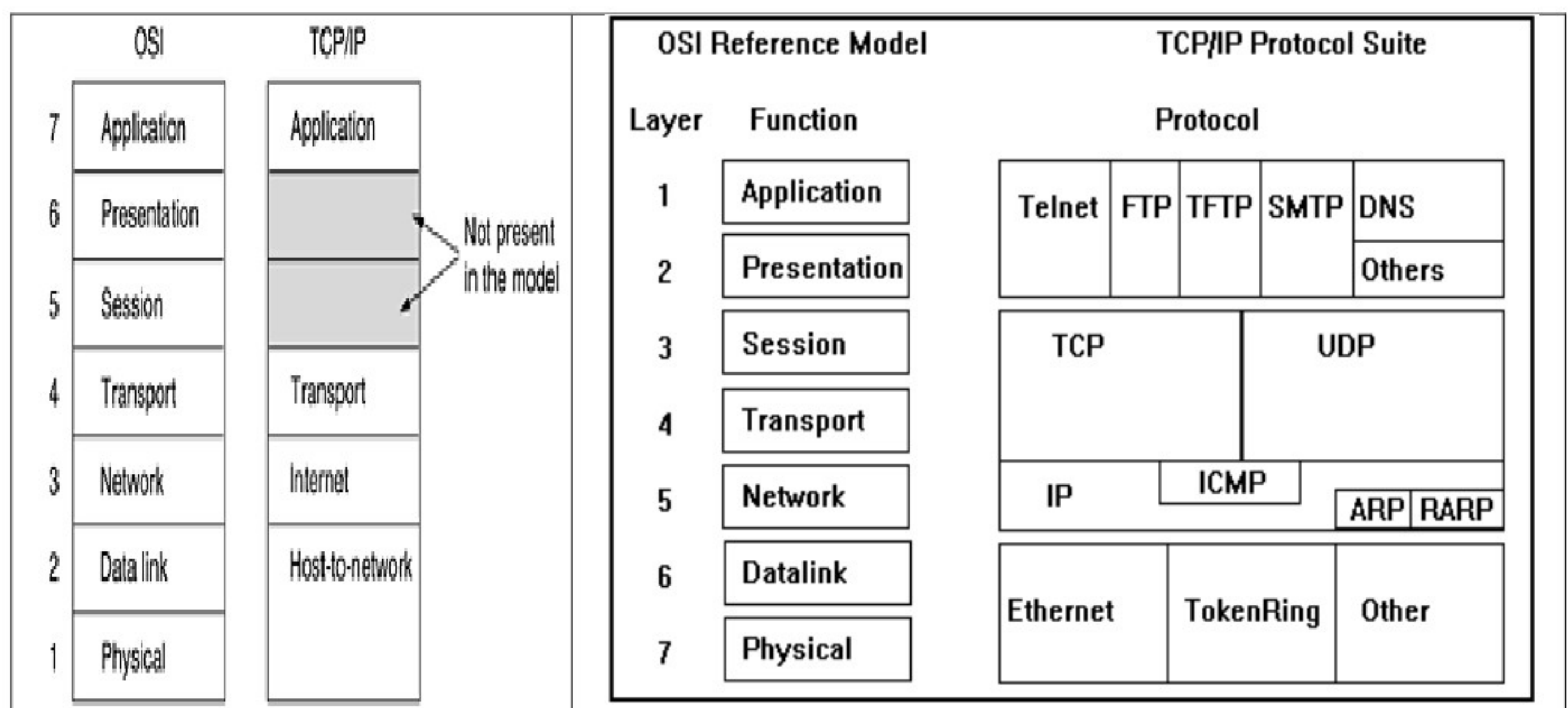
- The presentation layer is concerned with the syntax (format of the data) and semantics (meaning of each section of bits) of the information exchanged between two systems.
- The presentation layer structures data that is passed down from the application layer into a format suitable for network transmission.
- It is responsible for data encryption and decryption, data compression and decompressions, character set conversion etc.

Application Layer:-

- The application layer enables the user, whether humans or software to access the network.
- It provides user interfaces and supports services such as E-mail, remote file access and transfer and share database management and other types of distributed information services.
- Protocols at these level includes, HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), SMTP(Simple Mail Transfer Protocol), NFS (Network File Services), NVT (Network Virtual Terminal).

2. Explain TCP/IP model in detail and also explain the function of each layer.

- TCP/IP (Transmission control Protocol/Internet Protocol) model was developed before the OSI model. So, TCP/IP model do not match exactly with those in the OSI model.
- TCP/IP model is made of five layers Physical, Data, Link, Network, Transport and Application.
- The first four layers of the TCP/IP model are same as the first four layers of the OSI model.
- The three topmost layers in the OSI model (Session, Presentation and Application) are represented in TCP/IP by a single layer called Application layer.



Physical and Data link layer: - The function of the physical and data link layer are almost same as in OSI model.

Network or IP layer: - The function of the Network layer will be explained by following protocols.

- **IP (Internetwork Protocol):** IP is transmission mechanism used by TCP/IP. It is connectionless and unreliable protocol. Packets in the IP layer called Datagram.
- **ICMP (Internet Control Message Protocol):** ICMP used to handle control and error messages in the IP layer.
- **IGMP (Internet Group Message Protocol):** IGMP has been designed to help a multicast (more than one) router identify the hosts in a LAN that are members of a multicast group. IP protocols involved in two types of communications.
- **Unicasting:** One to One Communication.
- **Multicasting:** One to Many Communications.
- Some process sometimes needs to send same message to a large number of receivers at same time. This is called Multicast. So for multicasting purpose IGMP protocol is used.
- **ARP (Address Resolution Protocol):** ARP is used to find the physical address of the node when the Internet address (IP address) is known.
- **RARP (Reverse Address Resolution Protocol):** RARP is used to find the Internet address (IP address) of the node when its physical address is known.

Transport Layer: - The function of the Transport layer will be explained by following protocols.

- **TCP (Transmission Control Protocol):** TCP provides full transport layer services to applications. It is connection oriented and reliable protocol. The packet in Transport Layer is called segment. It is slower than UDP (User Datagram Protocol).
- **UDP (User Datagram Protocol):** UDP is connectionless and unreliable protocol. The packet produces by UDP is called User Datagram.
- Both TCP and UDP protocols are Port to Port communication protocol.

Application Layer: - The function of the Application Layer will be explained by following protocols.

- **SMTP (Simple Mail Transfer Protocol):** TCP/IP protocol that supports electronic mail (E-mail) on the internet is called SMTP.
- **FTP (File Transfer Protocol):** It is the standard mechanism provided by the TCP/IP for copying file from one computer to another computer. To copy the file some problems must occurs like two systems may use different file structure, two systems may have different way to represent text and data, and two systems may have different directory structures. All this problems have been solved by FTP.
- **TFTP (Trivial Transfer Protocol):** TFTP protocol simply copies the file here they do not need to solve the problems provided in FTP. Here there is only two operations
 1. Reading – It means copying a file from the server site to the client site
 2. Writing – It means copying a file from the client site to the server site.
- **SNMP (Simple Network Management Protocol):** SNMP provides a set of fundamental operations for monitoring and maintaining devices in the internet.
- **TELNET (Terminal Network):** TELNET is a general purpose client server application program used for remote login.

3. Give the comparison of OSI and TCP/IP model.

OSI Model	TCP/IP Model
OSI model developed after TCP/IP model.	TCP/IP model developed before OSI model.
OSI model has seven layers.	TCP/IP model has five layers.
OSI model were developed before the corresponding protocols were developed.	The protocols came first and the model was developed using the existing protocols.
Three concepts are covered to the OSI model <ul style="list-style-type: none"> • Services • Interfaces • Protocol OSI model clearly differentiate between Services, Interfaces and Protocol.	TCP/IP model did not clearly differentiate between Services, Interfaces and Protocol.
OSI model supports both connectionless and connection oriented communication in the Network layer but only connection-oriented communication in the transport layer.	TCP/IP model supports connectionless communication in the Network layer but both connectionless and connection-oriented communication in the transport layer.
Session and presentation layers are present in OSI model.	Session and presentation layers are not present in TCP/IP model.

4. Give the comparison of Connection Oriented & Connectionless Services.

Connection Oriented Services	Connectionless Services
Connection must be established prior to data transmission.	Data is sent without any prior establishment of connection.
It is complex compare to connectionless services.	It is very simple.
Data transmission speed is low.	Data transmission speed is high.
Data is sent by the application with no particular structure.	Data is sent in discrete packages by the applications.
It is reliable.	It is unreliable.
Its provide acknowledgement.	It doesn't provide acknowledgement.
TCP is example of connection oriented services.	UDP is the example of connectionless services.