q1)what is internet?

sol)

- The Internet is a computer network that interconnects hundreds of millions of computing devices throughout the world

Hosts or End systems :

1. Systems that are connected to Internet

Communication links :

1. Coaxial cable, Copper wire, Optical fiber, and Radio spectrum

Transmission rate :

1. measured in bits/second

Packet switches types :

1. Routers and Link-layer switches

2.Routers : Used in network core

3.Link layer switches : Used in access networks

Protocols :

1. controls the sending and receiving of information within the Internet

Most important protocols in the Internet :

1. Transmission Control Protocol (TCP)

2. Internet Protocol (IP)

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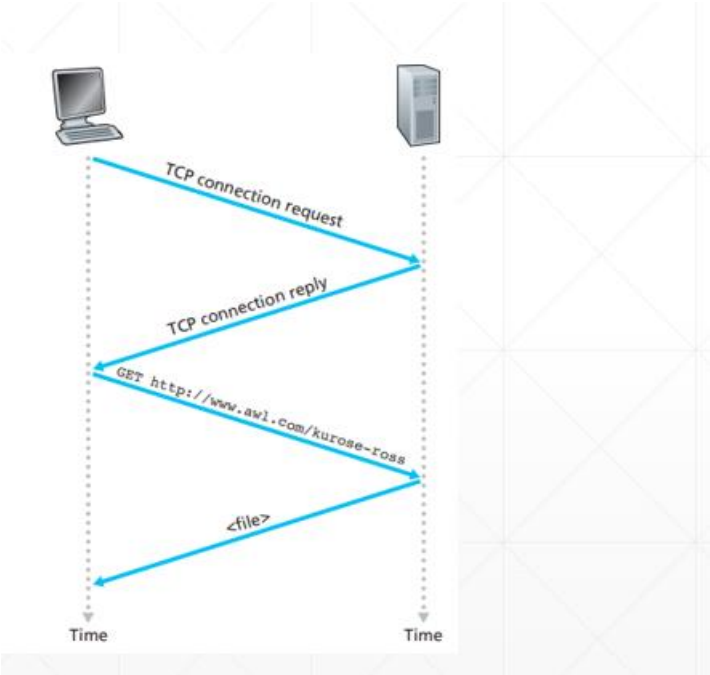
q2)what is protocol?
sol)

- protocol is a set of rules that determine how data is transmitted between different devices in the same network.



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q3)explain network edge?
sol)

End systems :

- the computers and other devices connected to the Internet

End systems include:

a) desktop computers (e.g., desktop PCs, Macs, and Linux boxes),
b) servers (e.g., Web and e-mail servers), and
c) mobile computers (e.g., laptops, smartphones, and tablets).

Hosts are divided into two categories:

Clients:

- desktop and mobile PCs, smartphones, etc.

Servers:

- more powerful machines that store and distribute Web pages, stream video, relay e-mail, etc

Access Networks:

- the network that physically connects an end system to the first router
- First router is also known as the “edge router”

they are 2 types in newwork access:

1. Digital Subscriber Line (DSL)
2. Cable Internet access

1.Digital Subscriber Line (DSL)

- line carries both data and traditional telephone signals which are encoded at different frequencies:
- A high-speed downstream channel, in the 50 kHz to 1 MHz band
- A medium-speed upstream channel, in the 4 kHz to 50 kHz band
- An ordinary two-way telephone channel, in the 0 to 4 kHz band

2.Cable Internet access:

- makes use of the cable television company's existing cable television infrastructure.
- Fiber optics connect the cable head end to neighborhood-level junctions

- Coaxial cable is then used to reach individual houses and apartments
- Each neighborhood junction typically supports 500 to 5,000 homes

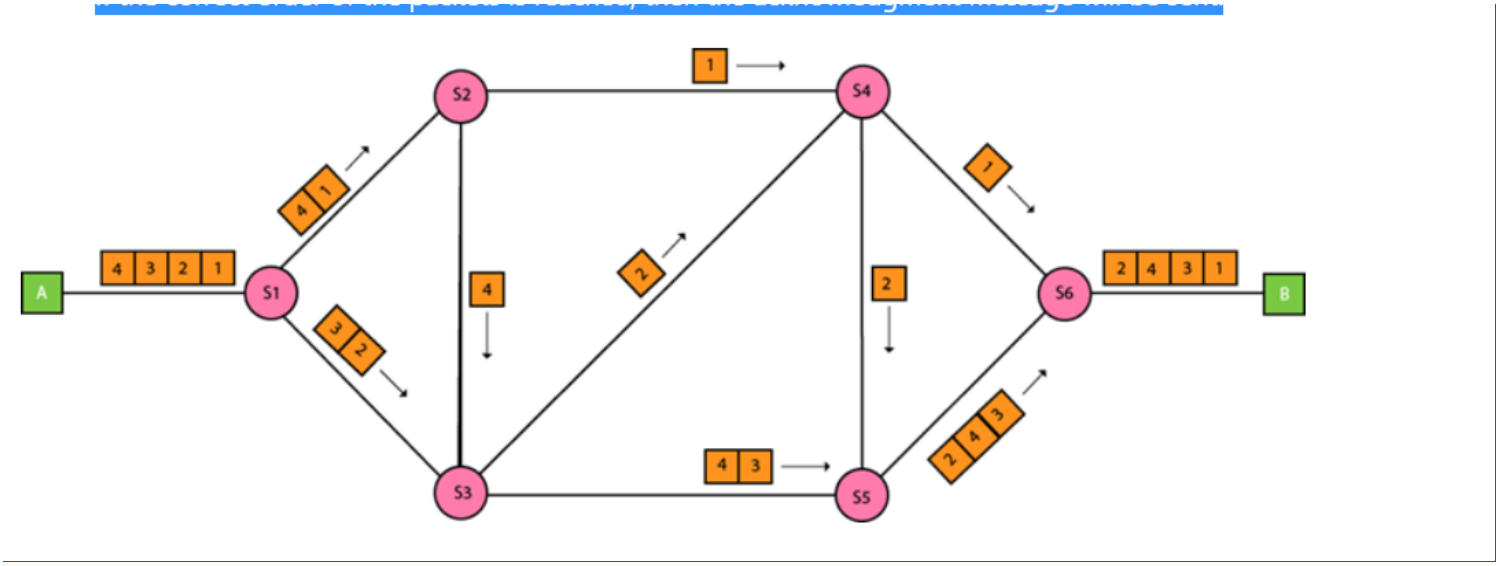
q4)explain network core?
sol)

PACKET SWITCHING:

1. In a network application, end systems exchange messages with each other
2. Messages may perform a control function or can contain data, such as an email message, a JPEG image, or an MP3 audio file

3. The source breaks long messages into smaller chunks of data known as packets
4. Each packet travels through communication links and packet switches
5. Packets are transmitted at a rate equal to the full transmission rate of the link
6. The time to transmit the packet is L/R seconds
7. Packet switches use store-and-forward transmission at the inputs to the links
8. Packet switch must receive the entire packet before it can transmit
9. Packets will travel across the network, taking the shortest path as possible.
10. All the packets are reassembled at the receiving end in correct order.
11. If any packet is missing or corrupted, then the message will be sent to resend the message.

12. If the correct order of the packets is reached, then the message will be sent.



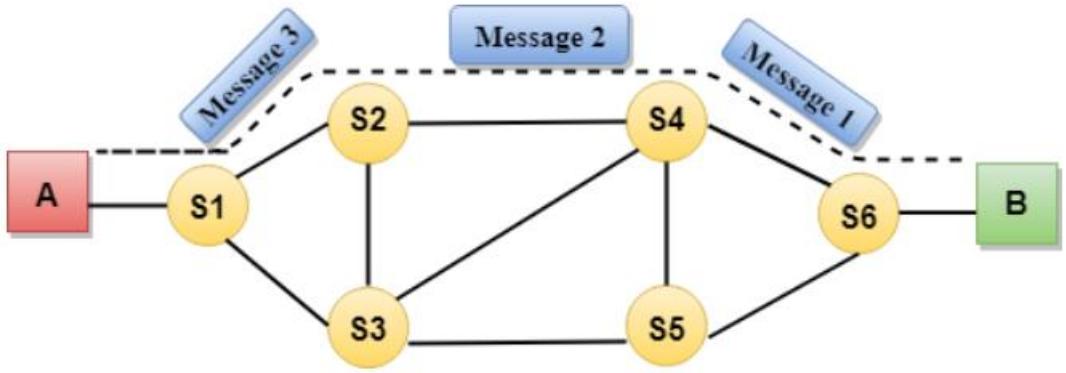
CIRCUIT SWITCHING:

1. Circuit switching is a switching technique that establishes a dedicated path between sender and receiver.
2. Traditional telephone networks are examples of circuit-switched networks
3. If each link between adjacent switches has a transmission rate of 1 Mbps

4. then each end-to-end circuit-switch connection gets 250 kbps of dedicated transmission rate.
5. Circuit switching is used in public telephone network.
6. It is used for voice transmission.
7. Fixed data can be transferred at a time in circuit switching technology.

Communication in circuit switching has 3 phases:

1. Circuit establishment
2. Data transfer
3. Circuit Disconnect



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q5)comparison between circuit switching and packet switching?

sol)

Circuit Switching	Packet Switching
Physical path between source and destination	No physical path
All packets use same path	Packets travel independently
Reserve the entire bandwidth in advance	Does not reserve
Bandwidth Wastage	No Bandwidth wastage
No store and forward transmission	Supports store and forward transmission

Circuit Switching	Packet Switching
In-circuit switching has there are 3 phases: i) Connection Establishment. ii) Data Transfer. iii) Connection Released.	In Packet switching directly data transfer takes place.
In-circuit switching, each data unit knows the entire path address which is provided by the source.	In Packet switching, each data unit just knows the final destination address intermediate path is decided by the routers.
In-Circuit switching, data is processed at the source system only	In Packet switching, data is processed at all intermediate nodes including the source system.
The delay between data units in circuit switching is uniform.	The delay between data units in packet switching is not uniform.
Resource reservation is the feature of circuit switching because the path is fixed for data transmission.	There is no resource reservation because bandwidth is shared among users.

Resource reservation is the feature of circuit switching because the path is fixed for data transmission.	There is no resource reservation because bandwidth is shared among users.
Circuit switching is more reliable.	Packet switching is less reliable.
Wastage of resources is more in Circuit Switching	Less wastage of resources as compared to Circuit Switching
It is not a store and forward technique.	It is a store and forward technique.
Transmission of the data is done by the source.	Transmission of the data is done not only by the source but also by the intermediate routers.
Congestion can occur during the connection establishment phase because there might be a case where a request is being made for a channel but the channel is already occupied.	Congestion can occur during the data transfer phase, a large number of packets comes in no time.
Circuit switching is not convenient for handling bilateral traffic.	Packet switching is suitable for handling bilateral traffic.

Circuit switching is not convenient for handling bilateral traffic.	Packet switching is suitable for handling bilateral traffic.
In-Circuit switching, the charge depends on time and distance, not on traffic in the network.	In Packet switching, the charge is based on the number of bytes and connection time.
Recording of packets is never possible in circuit switching.	Recording of packets is possible in packet switching.
In-Circuit Switching there is a physical path between the source and the destination	In Packet Switching there is no physical path between the source and the destination
Circuit Switching does not support store and forward transmission	Packet Switching supports store and forward transmission
Call setup is required in circuit switching.	No call setup is required in packet switching.
In-circuit switching each packet follows the same route.	In packet switching packets can follow any route.

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In-circuit switching each packet follows the same route.	In packet switching packets can follow any route.
The circuit switching network is implemented at the physical layer.	Packet switching is implemented at the datalink layer and network layer
Circuit switching requires simple protocols for delivery.	Packet switching requires complex protocols for delivery.

q6)explain protocal layering?
sol)

Network designers organize Protocols and The network hardware and software that implement the protocols

1.Application Layer:

- Application Layer Protocols :

1.HTTP protocol (for Web document request and transfer)

2.SMTP (for the transfer of e-mail messages)

3.FTP (for the transfer of files between two end systems)

- An application-layer protocol is distributed over multiple end systems
- packet of information at the application layer is a message

2.Transport Layer:

- Transports application-layer is the messages between application endpoints

This layer provides :

1.guaranteed delivery of messages to the destination

2.flow control

the Two transport protocols are:

1.TCP

2.UDP

- Transport-layer packet is a segment

3.Network Layer:

- this network layer is Responsible for moving datagrams from one host to another
- Network Layer Protocol are:

  1.IP Protocol
- Network layer contains routing protocols that determine the routes
- Network-layer packet is a datagram

4.Link Layer:

- this link layer is Responsible for moving entire frames from one network element to an adjacent network element
- Services provided by the link layer depend on the specific link-layer protocol

Link Layer Protocols are:

1.Ethernet

2.WiFi

3.the cable access network's DOCSIS protocol

- Link Layer packets are frames

5.Physical Layer:

- this Physical Layer is Responsible for moving the individual bits within the frame from one node to the next node
- this Protocols is link dependent
- Depends on the actual transmission medium of the link

Example :

A) twisted-pair copper wire
B) single-mode fiber optics etc

.....

q7)difference between TCP VS UDP?
SOL)

TCP stands for Transmission Control Protocol.

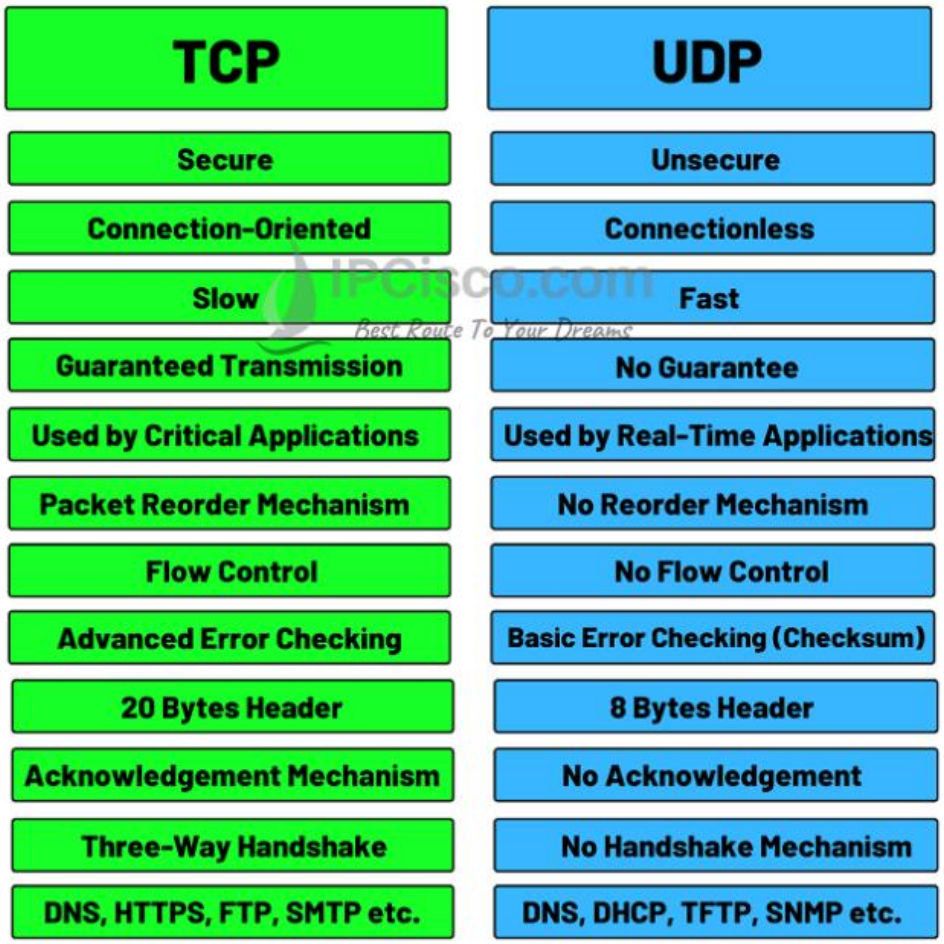
The UDP stands for User Datagram Protocol.

TCP vs UDP

- Connected
- State Memory
- Byte Stream
- Ordered Data Delivery
- Reliable
- Error Free
- Handshake
- Flow Control
- Relatively Slow
- Point to Point
- Security: SSL/TLS

- Connectionless
- Stateless
- Packet/Datagram
- No Sequence Guarantee
- Lossy
- Error Packets Discarded
- No Handshake
- No Flow Control
- Relatively Fast
- Supports Multicast
- Security: DTLS

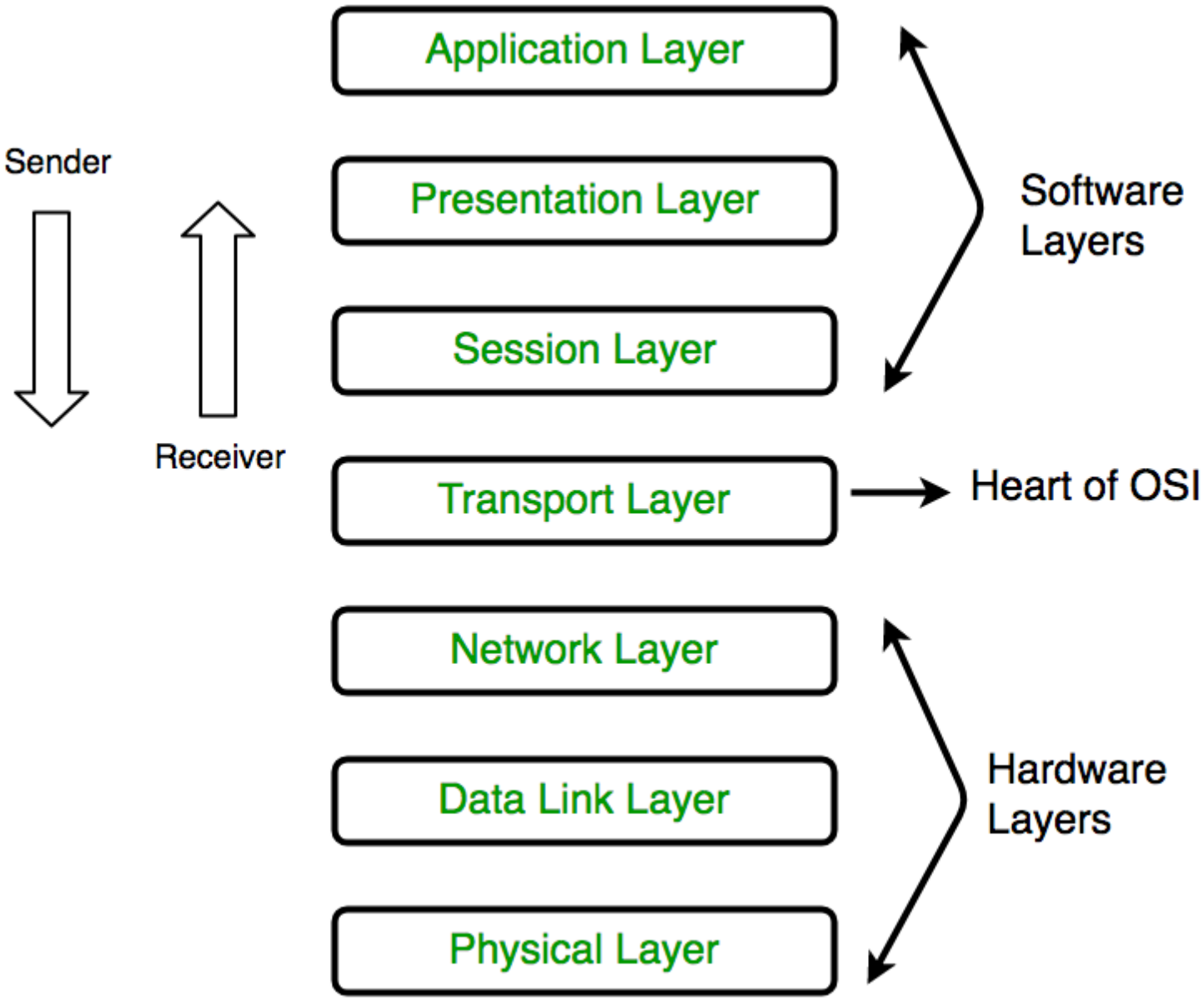
vv.



q8)expalin about OSI model?

sol)

- OSI stands for Open Systems Interconnection
- It has been developed by ISO



1. Physical Layer (Layer 1):

- The lowest layer of the OSI reference model is the physical layer.
- It is responsible for the actual physical connection between the devices
- The physical layer contains information in the form of bits.

2. Data Link Layer (DLL) (Layer 2) :

- The data link layer is responsible for the node-to-node delivery of the message.
- he main function of this layer is to make sure data transfer is error-free from one node to another,

3. Network Layer (Layer 3) :

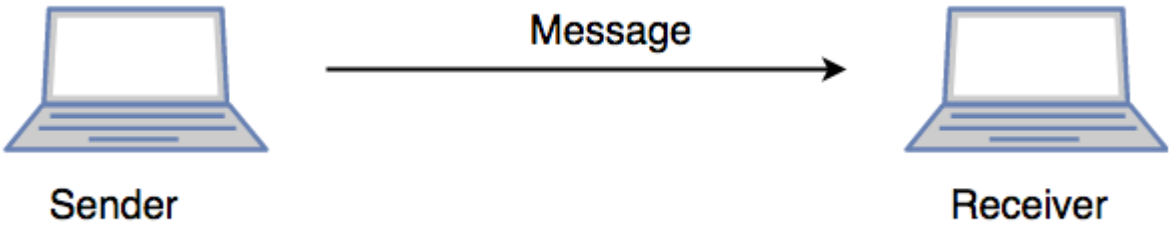
- The network layer works for the transmission of data from one host to the other located in different networks
- It also takes care of packet routing
- he sender & receiver's IP addresses are placed in the header by the network layer.

4. Transport Layer (Layer 4) :

- The transport layer provides services to the application layer and takes services from the network layer.
- The data in the transport layer is referred to as Segments
- It is responsible for the End to End Delivery of the complete message

5. Session Layer (Layer 5) :

- This layer is responsible for the establishment of connection, maintenance of sessions, authentication, and also ensures security.



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6. Presentation Layer (Layer 6):

- The presentation layer is also called the Translation layer.
- The data from the application layer is extracted here and manipulated as per the required format

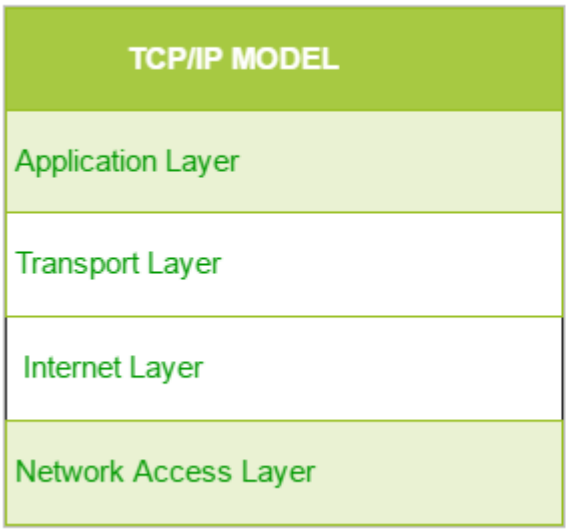
7. Application Layer (Layer 7) :

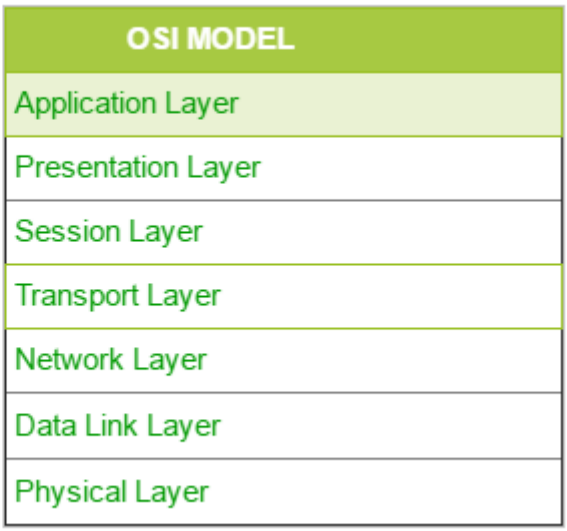
- it is the very top of the OSI Model
- This layer also serves as a window for the application services to access the network and for displaying the received information to the user.

q9)explain TCP/IP model?
sol)

- it was designed and developed by Department of Defense (DoD) in 1960s

- is based on standard protocols
- It stands for Transmission Control Protocol/Internet Protocol.
- The TCP/IP model is a concise version of the OSI model.
- It contains four layers, unlike seven layers in the OSI model.
- The layers are:
- 1.Process/Application Layer
- 2.Host-to-Host/Transport Layer
- 3.Internet Layer
- 4.Network Access/Link Layer
- The diagrammatic comparison of the TCP/IP and OSI model is as follows :





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1. Network Access Layer:

- This layer corresponds to the combination of Data Link Layer and Physical Layer of the OSI model.
- It looks out for hardware addressing and the protocols present in this layer allows for the physical transmission of data.

2. Internet Layer:

- This layer parallels the functions of OSI's Network layer.
- It defines the protocols which are responsible for logical transmission of data over the entire network.
- The main protocols residing at this layer are :

i)IP

ii)ICMP

iii)ARP

3Transport Layer:

- The transport layer is responsible for the reliability, flow control, and correction of data which is being sent over the network
- The two protocols used in the transport layer,they are

  i)User Datagram protocol

  ii) Transmission control protocol.

4.Application Layer:

- An application layer is the topmost layer in the TCP/IP model.
- It is responsible for handling high-level protocols, issues of representation.
- This layer allows the user to interact with the application
- the main protocols used in the application layer:

  i)HTTP

  ii)SNMP

  iii)SMTP

  iV)DNS

  v)TELNET

vi)FTP

q10)comaparision between TCP/IP and OSI model?
sol)

TCP/ IP	OSI
TCP refers to Transmission Control Protocol.	OSI refers to Open Systems Interconnection.
TCP/IP has 5 layers.	OSI has 7 layers.
TCP/IP is more reliable	OSI is less reliable
TCP/IP does not have very strict boundaries.	OSI has strict boundaries
TCP/IP follow a horizontal approach.	OSI follows a vertical approach.
TCP/IP uses both session and presentation layer in the application layer itself.	OSI uses different session and presentation layers.
TCP/IP developed protocols then model.	OSI developed model then protocol.
Transport layer in TCP/IP does not provide assurance delivery of packets.	In OSI model, transport layer provides assurance delivery of packets.
TCP/IP model network layer only provides connection less services.	Connection less and connection oriented both services are provided by network layer in OSI model.
Protocols cannot be replaced easily in TCP/IP model.	While in OSI model, Protocols are better covered and is easy to replace with the change in technology.