Assignment 2

Differentiate between OSI and TCP/IP model.

OSI(Open System Interconnection)	TCP/IP(Transmission Control Protocol / Internet Protocol)
OSI is a generic, protocol independent standard, acting as a communication gateway between the network and end user.	TCP/IP model is based on standard protocols around which the internet has developed. It is a communication protocol, which allows connection of hosts over a connection.
In OSI model the transport layer guarantees the delivery of packets.	In TCP/IP model the transport layer does not guarantees delivery of packets. Still the TCP/IP model is more reliable.
Follows vertical approach.	Follows horizontal approach.
OSI model has a separate presentation layer and session layer.	TCP/IP does not have a separate presentation layer or session layer.
OSI is a reference model around which the networks are built. Generally it is used as a guidance tool.	TCP/IP model is, in a way implementation of the OSI model.
Network layer of OSI model provides both connections oriented and connectionless service.	The network layer in TCP/IP model provides connectionless service.
OSI model has a problem of fitting the protocols into the model.	TCP/IP model does not fit any protocol.
Protocols are hidden in OSI model and are easily replaced as the technology changes.	In TCP/IP replacing protocol is not easy.
OSI model defines services, interfaces and protocols very clearly and makes	In TCP/IP, services, interfaces and protocols are not

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clear distinction between them. It is protocol independent.	clearly separated. It is also protocol dependent.
It has 7 layers.	It has 5 layers.

Differentiate between peer to peer vs client/server network.

Peer to peer Network	Client/server Network
Clients and server are not distinguished; each node act as client and server.	There is a specific server and specific clients connected to the server.
Each node can request for services and can also provide the services.	The client request for service and server respond with the service.
Connectivity	Sharing the information
Each peer has its own data.	The data is stored in a centralized server.
As the services are provided by several servers distributed in the peer to peer system, a server in not bottlenecked.	When several clients request for the services simultaneously, a server can get bottlenecked.
Peer to Peer are less expensive to implement.	The client-server are expensive to implement.
Peer to Peer suffers if the number of peers increases in the system.	Client-server is more stable and scalable.

What are the 7 layers of OSI model with the function of each layer?

The 7 layers of OSI model are :-

- Physical layer
- Data link layer
- Network layer
- Transport layer
- Session layer
- presentation layer
- Application layer

1. **Physical layer :**

- **Function**: This layer deals with the physical connection between devices and the transmission and reception of raw bitstreams over a physical medium. It involves the hardware elements like cables, switches, and network interface cards.
- **Key Concepts**: Bit rate control, modulation, physical topology, and transmission mode (simplex, half-duplex, full-duplex).

2. **Data Link Layer**:

- **Function**: The data link layer is responsible for node-to-node data transfer and error detection and correction. It ensures that data transferred between two adjacent nodes is error-free.
- **Key Concepts**: Frame creation, MAC addresses, error checking (CRC), flow control, and access control (MAC protocols like Ethernet).

3. **Network Layer**:
    - **Function**: This layer handles the routing of data packets from the source to the destination across multiple nodes and networks. It manages logical addressing and path determination.
    - **Key Concepts**: IP addressing, routing, packet forwarding, and subnetting.
4. **Transport Layer**:
    - **Function**: The transport layer provides reliable data transfer services to the upper layers. It ensures complete data transfer through error recovery and flow control mechanisms.
    - **Key Concepts**: Segmentation and reassembly, flow control, error correction, and protocols like TCP (Transmission Control Protocol) and UDP (User Datagram Protocol).
5. **Session Layer**:
    - **Function**: This layer establishes, manages, and terminates connections (sessions) between applications. It controls the dialogues between computers.

- **Key Concepts**: Session establishment, maintenance, termination, and synchronization.

6. **Presentation Layer**:
   - **Function**: The presentation layer translates data between the application layer and the network. It ensures that data is in a usable format and is properly encrypted and compressed.
   - **Key Concepts**: Data translation, encryption/decryption, data compression, and character code translation.
7. **Application Layer**:
   - **Function**: The application layer provides network services directly to end-users and applications. It facilitates communication with the network by offering various protocols and interfaces.
   - **Key Concepts**: Application services like email, file transfer, and network management, as well as protocols such as HTTP, FTP, SMTP, and DNS.

Principles behind OSI Model.

- **Layered Architecture**:
  - The OSI model is structured into seven distinct layers, each with specific functions. This separation allows for modularity and easier troubleshooting, as each layer handles a specific aspect of network communication.
- **Independence**:
  - Each layer operates independently, allowing changes or updates to be made to one layer without affecting the others. This separation enhances flexibility and scalability in network design and implementation.
- **Standardization**:
  - The OSI model promotes the use of standardized protocols and interfaces, ensuring interoperability between different vendors and technologies. This standardization facilitates global communication and integration.
- **Encapsulation**:

    - Data is encapsulated as it moves down the layers. Each layer adds its own header (and sometimes trailer) information to the data from the layer above. This encapsulation ensures that each layer can process and handle its own specific data independently.

- **Decoupling of Functions**:
    - The OSI model decouples functions by dividing network operations into discrete layers, each responsible for a specific set of tasks. This decoupling simplifies the network design and enables better management of complex network functions.
- **Interoperability**:
    - By adhering to the OSI model, different systems and technologies can communicate and work together seamlessly. This interoperability is crucial for ensuring that diverse network devices can exchange information efficiently.
- **Peer-to-Peer Communication**:
    - Each layer on one device communicates with its corresponding layer on another device, following a peer-to-peer communication model. This approach ensures that protocols and data formats are consistently applied across the network.
- **Flexibility**:
    - The layered approach allows for the integration of new technologies and protocols without disrupting existing systems. This flexibility supports innovation and the evolution of network technologies.
- **Abstract Layer Functions**:
    - Each layer provides a specific set of services to the layer above and relies on the services of the layer below. This abstraction hides the complexity of the underlying layers, making the overall system easier to understand and manage.
- **Error Handling and Recovery**:
    - The OSI model incorporates mechanisms for error detection and correction, ensuring reliable data transmission. Each layer has its own

error handling protocols to maintain data integrity.

With the help of these principles, the OSI model provides a robust and flexible framework for designing, implementing, and managing network communication systems.