1. Raise two main advantages of packet switching, compared to message switching.

In message switching operation, each router waits until it receives the entire message. Once it receives the complete message it transmits the same over the next link and so on. All the routers over the router does the same.

Message switching overhead is lower compare to packet switching, message is appended with header before transmission.

In packet switching message is divided into smaller packets amd each packet is appended with header before transmission.

Overhead in message switching = header/(header+message)

Overhead in packet switching = [n*header/(n*header+message)],Where, n = [message/packet_size]

Message switching has higher reliability and lower complexity. As in message switching, one single datagram is either received or lost. One single network path is used for the same.In packet switching, many packets generated by same node and belonging to the samedestination may take different paths. The packets received out of order will need to be sequenced using sequence number embedded in the header part.

May lose or corrupt a subset of the message but do not discard the entire message as in message switching. Hence based on overall corrupt message received, what could be correct message can be interpreted. Due to this reason, sometimes in the real time scenarios such as voice, message switching is not possible.Message switching takes more time compare to packet switching as entire message will be stored at each of the hop points till it is completely received

2. Given a 20-bit frame and bit-error-rate p in communication. What is the probability that the frame has no error? What is the probability of 1-biterrors?

- The probability that received frame contains no error is (1-p)20
- The probability that received frame contains at least one error is 1-(1-p)

3. Give two features that the data link layer and transport layer have in common, and further give two features in which they differ

Features they have in common:

• Both layers can provide recovery from transmission errors.

• Both layers can provide flow control.

• Both layers can support multiplexing.

Features in which they differ:

- The transport layer is end to end and involves the interaction of peer processes across the network. The data link layer involves the interaction of peer-to-peer processes that are connected directly. In general, the time that elapses in traversing a data link is much smaller the time traversing a network, where packets can become trapped in temporary routing loops. Consequently, transport layer protocols must be able to deal with out-of-sequence PDUs and a much larger backlog of PDUs than data link layers.
- The data link layer is concerned with framing and the transport layer is not.
- The data link layer may be concerned with medium access control, the transport layer does not have this concern

4. Which OSI layer is responsible for the following?

(a) Determining the best path to route packets.

The network layer is concerned with the selection of paths across the network.

(b) Providing end-to-end communications with reliable service.

The transport layer is concerned with providing reliable service on an end-to-end basis across the network.

(c) Providing node-to-node communications with reliable service.

The data link layer provides for the reliable transfer of information between adjacent nodes in a network.

5. How does the network layer in a connection-oriented packet-switching network differ from the network layer in a connectionless packet-switching network?

CONNECTIONLESS PACKET SWITCHING

Packet switching was originally designed so that the individual packets of a single message can follow any available path improving the link utilization. Packets arrive a tan intermediate node randomly and they are transmitted over any available outgoing free link. This technique is known as Connectionless Packet switching because no connection is established between the sender and the receiver.

Disadvantages of connectionless packet switching:

1. Extra processing power is required at the nodes for attaching source and destination addresses with every packet which also increases the required time of transmission.

2. Connectionless Packet switching requires overhead bits for indexing/numbering the packets.

3. Packets may arrive at the destination in a random manner. This requires that all the arriving packets are stored and rearranged.

4. Some packets may be lost in the network.