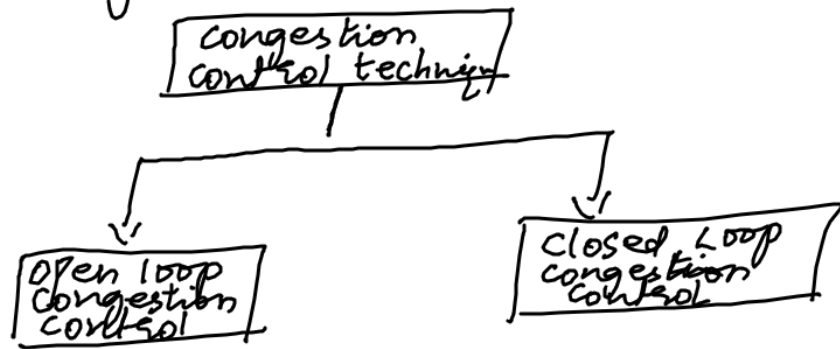


Q1) What is Congestion? Explain congestion control techniques?

Ans:- **Congestion**: Congestion is a situation in a network. are present in a part of network. The congestion takes place when the number of packets sent to the network is greater than the capacity of the network.

**Congestion control**: The congestion control is the technique used for preventing or controlling congestion.



✓ open Loop congestion control:  
These techniques are used to prevent congestion before it happens.

(i) **Retransmission Policy**:  
This policy is used to control retransmission of packets.  
Generally, a sender retransmits the packet if he feels that the packet is lost or corrupted.  
This retransmission may create congestion in the network.  
To prevent congestion, a timer must be designed.

(ii) **Window Policy**: There are two types of windows that can be used at sender side: "Go-back-n window" and "Selective Repeat window". In Go-back-n window, the packets are resent which may be duplicates. Where as in Selective Repeat Window only sends lost packets.

(iii) Discarding policy: In this policy, a router can discard the packet. A good discard policy can prevent congestion control.

(iv) Acknowledgement policy: The acknowledgement policy can also create congestion. For example, if the receiver sends acknowledgement for  $N$  packets rather than 1 packet then we can prevent congestion.

✓ Closed Loop Congestion Control:  
These techniques are used to control congestion after it happens

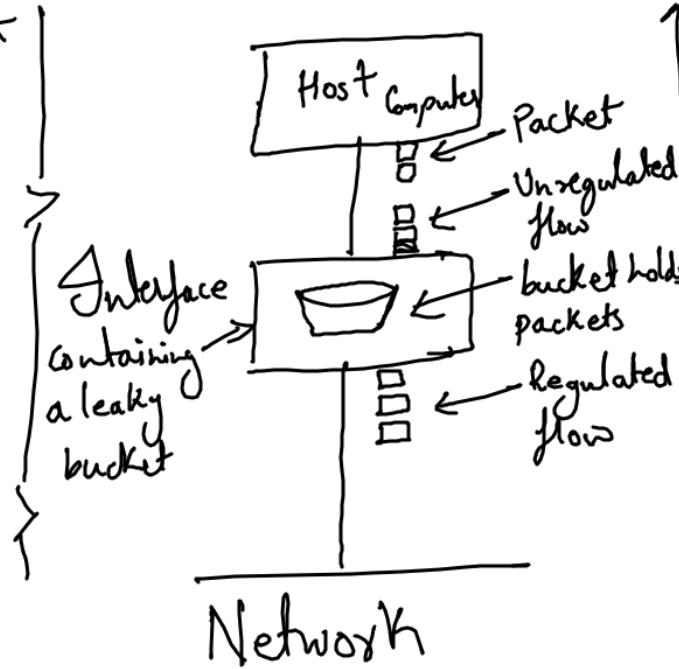
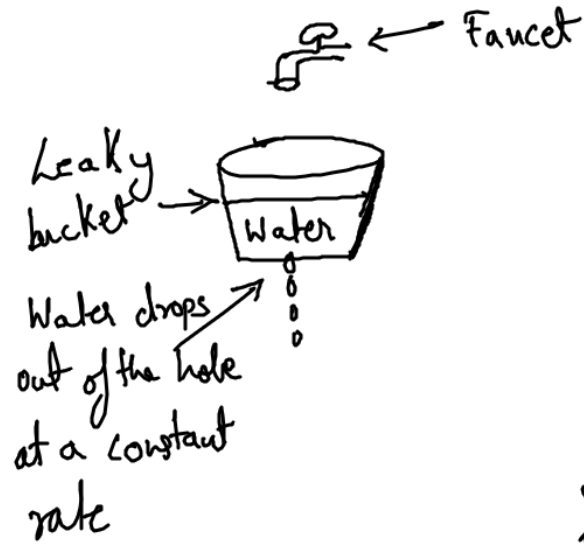
(i) Backpressure:

① Explain various congestion control algorithms?

Ans:- Leaky Bucket Algorithm:

✓ Leaky Bucket Algorithm is used to control congestion.  
✓ Leaky Bucket is a Bucket with a hole at bottom.  
✓ Flow of water from bucket is at a constant rate.  
✓ If bucket is full, any additional water entering the bucket is thrown out.  
⇒ Same technique is applied to control congestion.

- Every host in the network has a buffer (bucket) which is a queue.
- When host wants to send a packet, packet is sent to buffer.
- The buffer transmits packets at a constant rate.
- Bursty traffic is converted to uniform traffic.



① What is Routing? Explain different Routing algorithms?

Ans: A router has a routing table which contains destinations. A routing table can be static or dynamic.

Routing is a process of sending packets from source to destination with one or more routers.

Routing is done by network layer.

There are two types of routing algorithms:

1. Static routing algorithms.
2. Dynamic routing algorithms.

1. In static routing algorithm, routing table is not changed until network administrator changes it.

Ex: shortest path routing, Flooding,

Dynamic routing: Dynamic routing changes the routing table once there is a change in network topology or in a network.

Shortest path Routing  
✓ In shortest path routing, the path between each node is measured. Ex: Distance, bandwidth, average queue etc is measured.  
✓ The algorithm calculates the shortest path based on conditions (Distance, etc).  
✓ A graph is drawn which contains nodes, arcs and respective costs on the arcs.

There are two algorithms for finding shortest path

- i) Dijkstra's Algorithm
- ii) Bellman-Ford Algorithm

i) Dijkstra's Algorithm

Step 1:- Source node is initialized by filled circle.

Step 2:- Cost to reach all neighbour nodes are calculated.

Step 3:- Find the neighbour with least cost.

Step 4:- The neighbour with least cost is filled circle and treated as source node.

