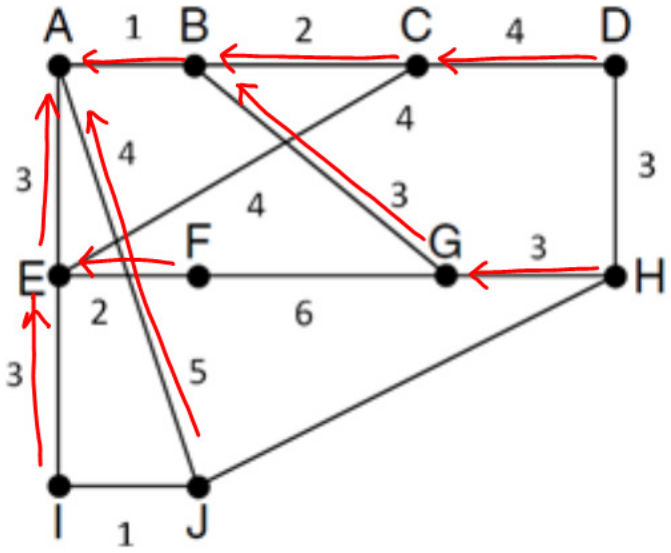
Computer Networks
Written Assignment 3

1. The red lines in Fig. 3 show the next hop towards A. This means packets destined to A forward along the red arrow. Use the reverse path forwarding to broadcast a packet of source A. If a node decides to broadcast, it broadcasts packet once in all directions except the one it receives from.
    a. What is the number of transmissions in the network?
    b. Find the sink tree for node A and find the number of transmission for broadcast using sink tree.
    c. What is the efficiency of this reverse tree?
    d. Try to find the sink tree with minimum weight.



2. Consider a host running token bucket flow control at the network layer. The network layer receives the traffic from the upper layer as shown in Fig. 4 (two bursts at rates 100 MB/s each lasts for 10 msec). The tokens are added to the bucket at rate 10MB/s. Plot the token size (the number of accumulated token bytes). The token size at time zero is zero and the maximum token size is 1MB. Assume that the network layer is able to transmit traffic up to rate 100 MB/s.
    a. Plot the output rate of the token bucket versus time.
    b. Plot the token size.
    c. Assume that the token size cannot exceed 400KB. Repeat parts a and b.
    d. Repeat part a for a leaky bucket with rate 20MB/s.

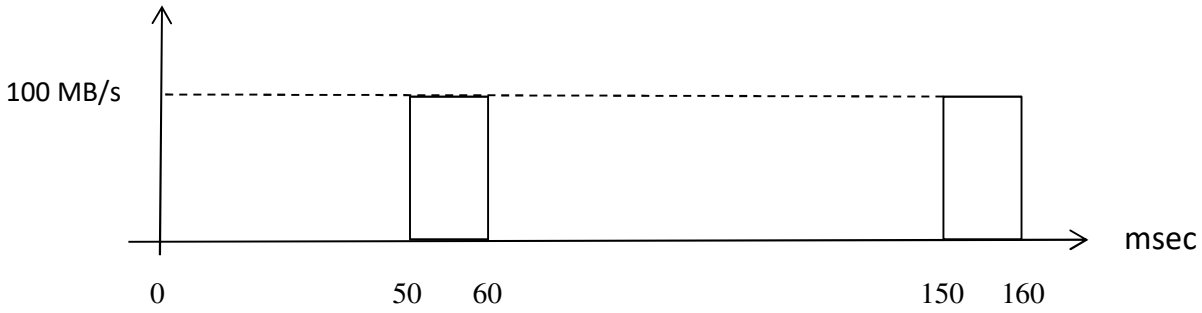
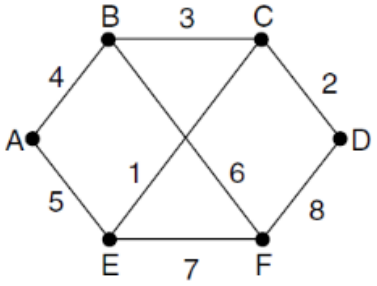
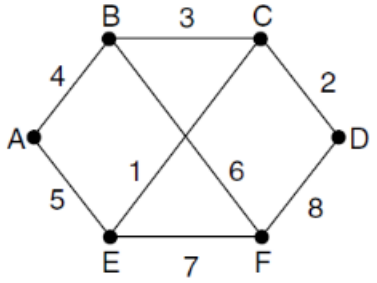


Fig. 4 Ingress (incoming) traffic rate to the token bucket

3. Consider the following network.
   a. Use distance vector routing to find the routing table at node A. Show all the steps until the convergence.
   b. Use the distance vector routing to find the path towards node A for all the nodes. Show all the steps until the convergence.



4. Use the Dijkstra algorithm and find the routing table at node A. Include all the steps.



5. Using the results of Problem 2, find the broadcast path of packets of *A* if we use reverse path forwarding for broadcast.

6. The forwarding table of a router is as follows:

Subnet address	Forwarding port
172.10.0.0/20	Port 1
172.10.16.0/19	Port 2
172.10.32.0/22	Port 3

Find the IP address range of these ports.