College of Engineering, Pune
Dept of Computer Engineering & Information Technology
END SEMESTER EXAMINATION – May 2012
Third Year B.Tech Computer Engineering
Computer Networks (CT 316)

Date: 28/4/2013 Time: 2.00pm to 5.00pm Durations: 3 hrs Max. Marks- 100

Instructions:

1. Answer any 5 complete questions.

Marks

Q. 1 a) Consider a reliable data transfer protocol that uses only negative acknowledgments (NAK). Suppose the sender sends data only infrequently. Would a NAK-only (where ACKs are not at all used) protocol be preferable to a protocol that uses ACKs? Why? Now suppose the sender has a lot of data to send and the end-to-end connection experiences few losses. In this second case, would a NAK-only protocol be preferable to a protocol that uses ACKs? Why? 6

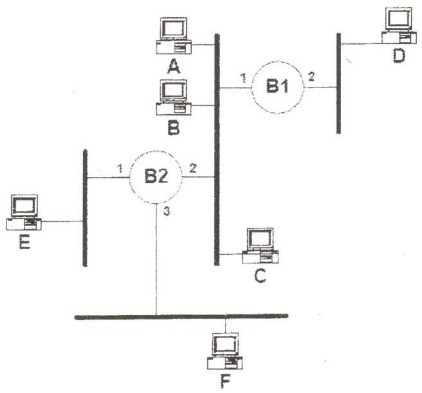
b) In following figure frames are generated at node A and sent to node C through node B. 10

The data rate between A and B is 100 kbps. The propagation delay is 5 msec/km for both the links. The links are full duplex and error free. All data frames are 1000 bits long; ACK frames are separate frames of negligible length. Between A and B, a sliding window protocol is used, with a window size of three. Between B and C, stop and wait is used. What is the total delay between A and B to receive a full window of frames at B? Determine the minimum transmission rate required between nodes B and C so that the buffers at node B are not flooded. (Hint: In order to avoid flooding the buffer of B, the average number of frames entering and leaving B must be the same over a long interval.)

c) Is it possible that a router implements several types of link layers, for example high-speed optical fiber, dial-up modems, and wireless and satellite connections? Justify your answer by considering the IP as a beneficiary. 4

Q. 2 a) Consider two networks: first one is built by using learning bridges and second one by using hubs. Which one will perform better to achieve higher aggregate throughput? Why? 4

b) 6



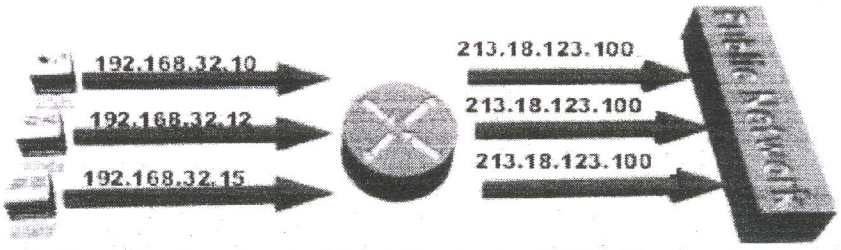
Consider the network with learning bridges as shown in the above figure. Assuming all

forwarding tables are initially empty, show the forwarding table in each of the bridges after the following sequential transmissions:

- A sends to C
- D sends to A
- F sends to E

c) What is the purpose of ARP cache? Give an example situation where how an ARP cache can cause a problem. 4

d) 6



The above diagram shows a situation in which the internal IP addresses are translated to a single external IP address. With proper table entries, explain how this system will handle the request and reply for the following cases:

a) A machine with IP address (192.168.32.10) has two browsers running and both are communicating with yahoo.com at the same time

b) Machines with IP addresses 192.168.32.10 and 192.168.32.12, each running with one browser communicating with yahoo.com

Q. 3 a) Fill the following table according to the features of the named connecting devices. 6

	Repeater	Bridge	Router	Gateway	Switch
Operating Layer					
Creates separate segments					
Connect different protocol networks					
Connect same protocol networks					
Maximum number of ports					

b) Assume that you have been assigned the 198.42.180.0/22 block of IP addresses. 8

A) How many subnets can be created that allows the creation of 200 hosts on each subnet.

B) What is the maximum number of hosts that can be assigned to each subnet?

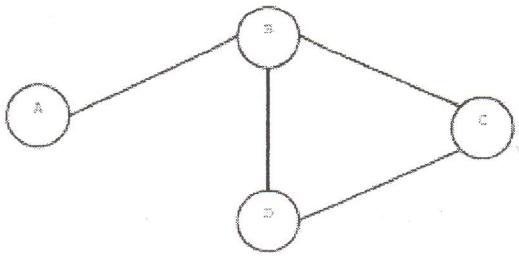
C) What is the subnet mask?

D) Give the IP address (in CIDR notation) of one of these subnets. Give the broadcast address for this subnet.

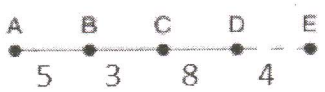
c) How can packet loss occur at the input ports of a router? Suggest any two solutions to overcome this. 6

Q. 4 a) Is there any advantage to multicast routers knowing the exact number of hosts on a network that belong to a given multicast group? Justify your answer with respect to IGMP for 1) data delivery to group members by the multicast router 2) membership update messages. 6

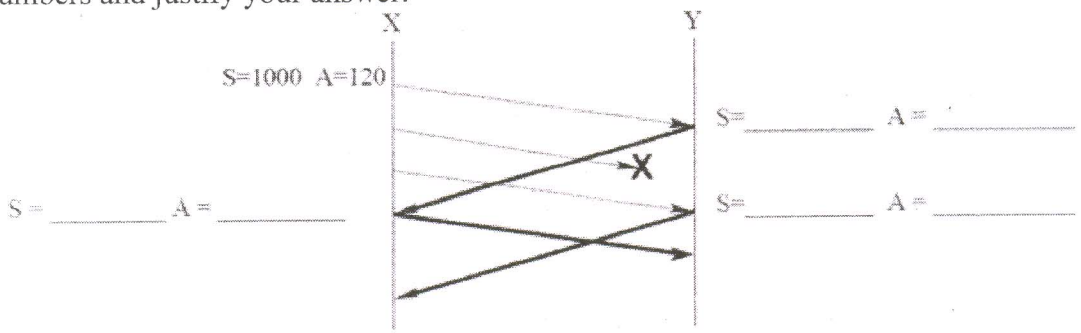
Consider the below network topology. Compute the shortest paths using the distance-vector algorithm. Assume that the network has just been initialized and that distance vectors are exchanged in rounds periodically. After each round, show the routing information available at each node. 8



c) Consider the count-to-infinity problem in the distance vector routing. Will the count-to-infinity problem occur if we decrease the cost of a link? How about if we connect two nodes which do not have a link? Justify your answer considering the network given below. Assume that CD link cost has come down to 3 and DE is the re-established link. 6



Q. 5 a) The following figure shows two hosts X and Y communicating over a duplex channel using TCP. Each segment contains 100 bytes of data. None of the segments shown in the figure are retransmitted packets, and the second segment send by X is lost. The sequence numbers (S) and acknowledgement numbers (A) for some segments (indicated by thicker line) are missing. Complete the figure below by filling in the missing sequence numbers and acknowledgement numbers and justify your answer. 6



b) Consider a TCP connection between A and B. Assume that A has received 10000 Bytes from the application and has sent to B the sequence numbers 100 through 500 (measured in bytes). 6

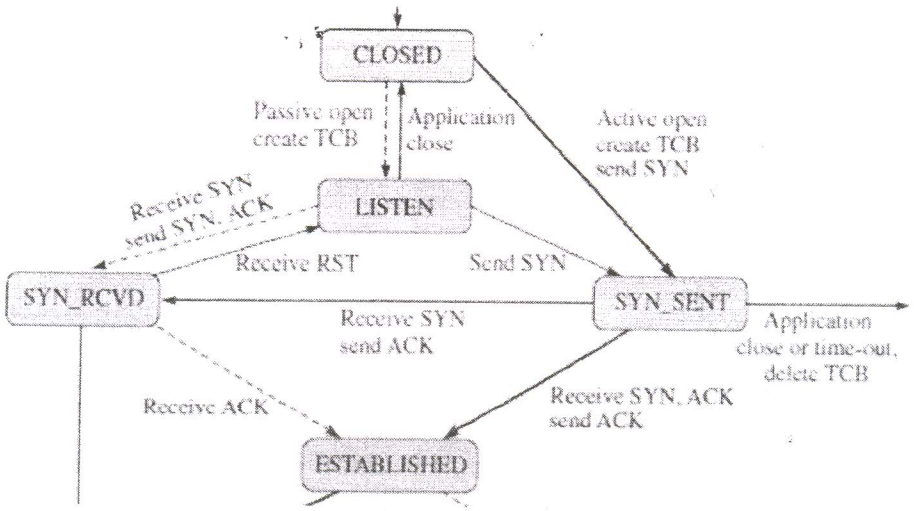
a) Show the advertised and sender windows at A, after A receives from B a segment with *AckNo=500, Window size = 500*. Which sequence numbers can A send to B?

b) After sending the segment with *(AckNo=500, Window size = 500)* in part (b), B wants to further reduce the advertised window by setting *Window size = 200* immediately before receiving another segment from A. Can it be possible for B to do so? Describe how B should proceed.

c) TCP sends a segment at 4:30:20. It does not receive an acknowledgment. At 4:30:25, it 4

retransmits the previous segment. It receives an acknowledgment at 4:30:27. Should the RTT be recalculated and, if so, what is the new value for RTT according to Karn's algorithm if the previous RTT was 4 seconds? Justify.

d) 4



The above diagram shows the state transitions of TCP during the connection setup. Describe the state transitions at the Server side and Client side when 1) the client initiates the setup 2) simultaneous open.

Q. 6 a) In normal client-server communication, the server is well known with a single port number? Is this same in case of FTP? If not, what shortcomings have made to bring a new mechanism and how does it work? 8

b) DNS Resolution can happen ITERATIVELY or RECURSIVELY. Discuss which method might be better (scaling) with reasons. 6

c) HTTP supports both non-persistent and persistent connections. Describe each type of connection and state which HTTP protocol version supports each type. How is the type of connection specified in the HTTP protocol? 6