EE122 - Midterm 1 Examination
EECS-UC Berkeley
October 2000

B

This is a closed book exam. The paper consists of 7 pages including the cover page. THe total poin obtinable for the paper is 100. Students are required to answer all questions. _Write your answers on this paper._ All papers must be returned to the examiner.
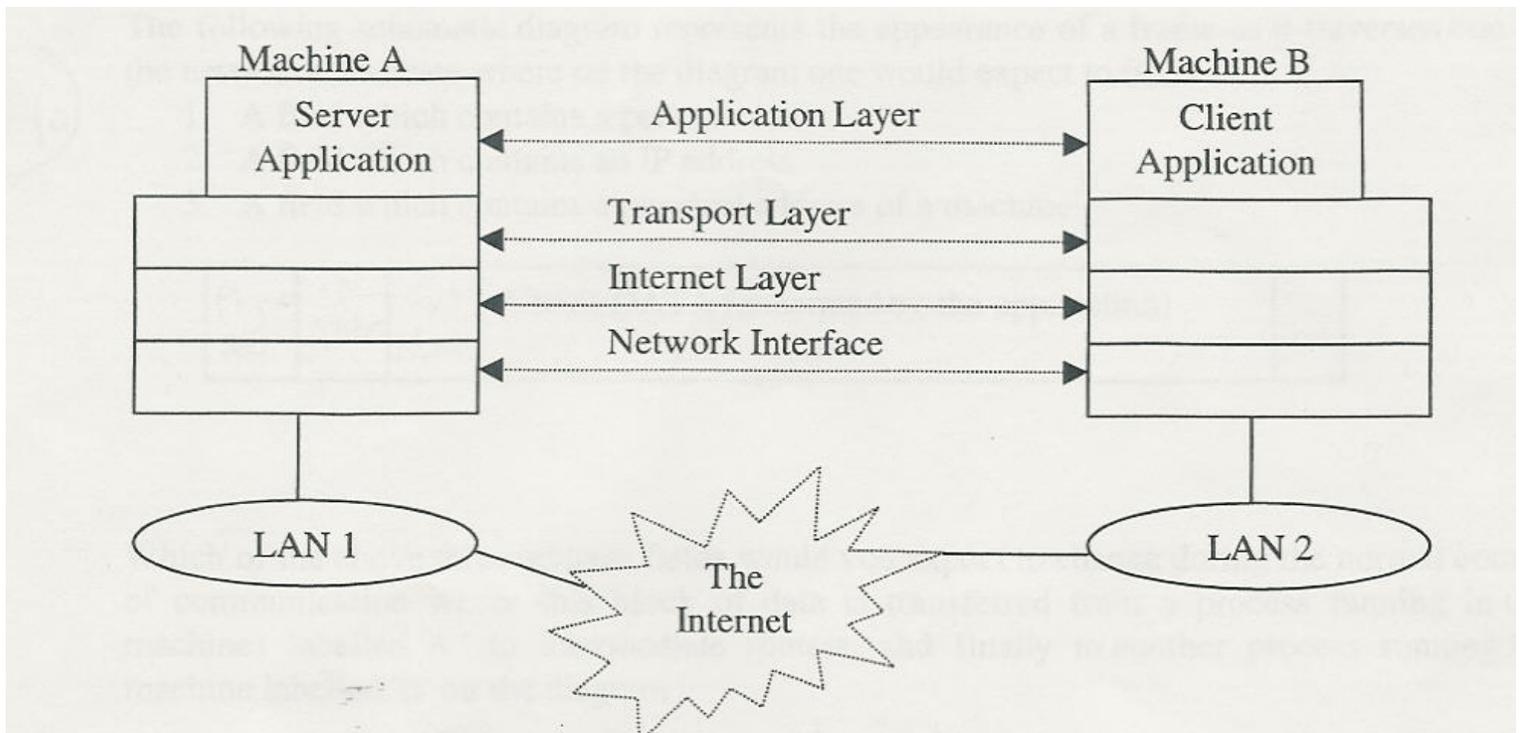
Student's Last Name:

First Name:

Discussion Section (Time & Day):

Student ID Number:

Signature:

SECTION A: General Concepts

Question I and II of this section of the paper are in reference to the diagram which immediately follows:

I. (10 Points)

The diagram represents a TCP/IP protocol suite. For each of the following provie a) the full name fo the protocol, b) the name of an appropriate protocol layer, and c) the main funtion of the protocol. Very brief answerd are expected.

1. UDP
a)
b)
c)
2. FTP
a)
b)
c)
3. ICMP
a)
b)
c)
4. DNS
a)
b)
c)
5. IP
a)
b)
c)

II. (10 Points)

The following schematic diagram represents the appearance of a fame as it traverses one of the networks. Indicate where on the diagram one would expect to find:
1. A field which contains a port number.
2. A field which contains an IP address
3. A field which contain a physical address of a machine

| Physical Addr | IP Addr | Ext N_addr | USER DATA (generated by the application) | |

Which of the above three address fields would you expect to change during the normal course of communication where this block of data is transfered from a process running in the machines labelled 'A' to intermediate routers, and finally to another process running in machine labelled 'B' on the diagram.

III. (10 Points)

i. Many applicaiton programs that rely on User Datagram Protocal (UDP) work well in a local environment but fail in dramatic ways when used in a larger internet. What could be the reason for the failure?

ii. What additional features you need to add on top of the UDP in order to provide atransport service similar to TCP's ?

IV. (10 Points)

State briefly functions of the transport and the network layers in the OSI network architecture.

SECTION B: Bridges & IP network protocol

V. (20 Points)

The following diagram shows three Ethernets connected by two transparent bridges. The diagram also shows sequences of frames sent between various pairs of computers on these LANs. Initially the bridges have nothing on its routing table (Filtering Databases). They learn what to put in its routing tables by observing traffic.
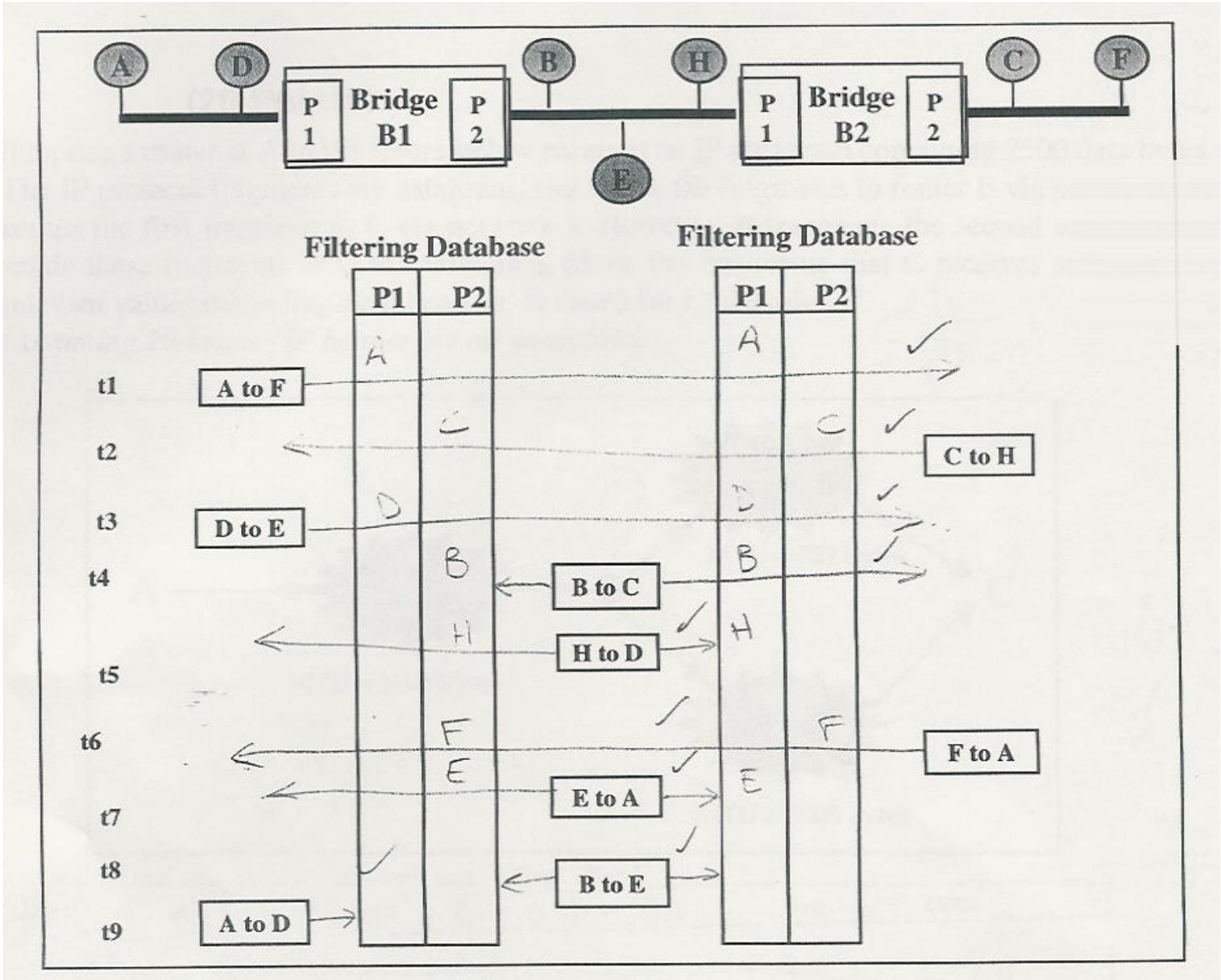
1. Fill out the above routing tables as time goes from time t1 to t9.
2. Describe briefly the learning procedure.

VI. (20 Points)

Suppose a router at A in the figure below receives an IP datagram containing 2500 data bytes. The IP protocol fragments the datagram, and routes the fragments to rounter B via network 1. B routes the first fragment to C via network 3. However, B fragments the second segment and sends these fragments to C via network 2. Show the fragmetns that C receives and specify relevant values in the fragment headers. No need for explanation. *(Assuming 20- header IP header for all diagrams)*

A — MTU = 1500 bytes — B — MTU = 552 bytes — C — MTU = 1500 bytes
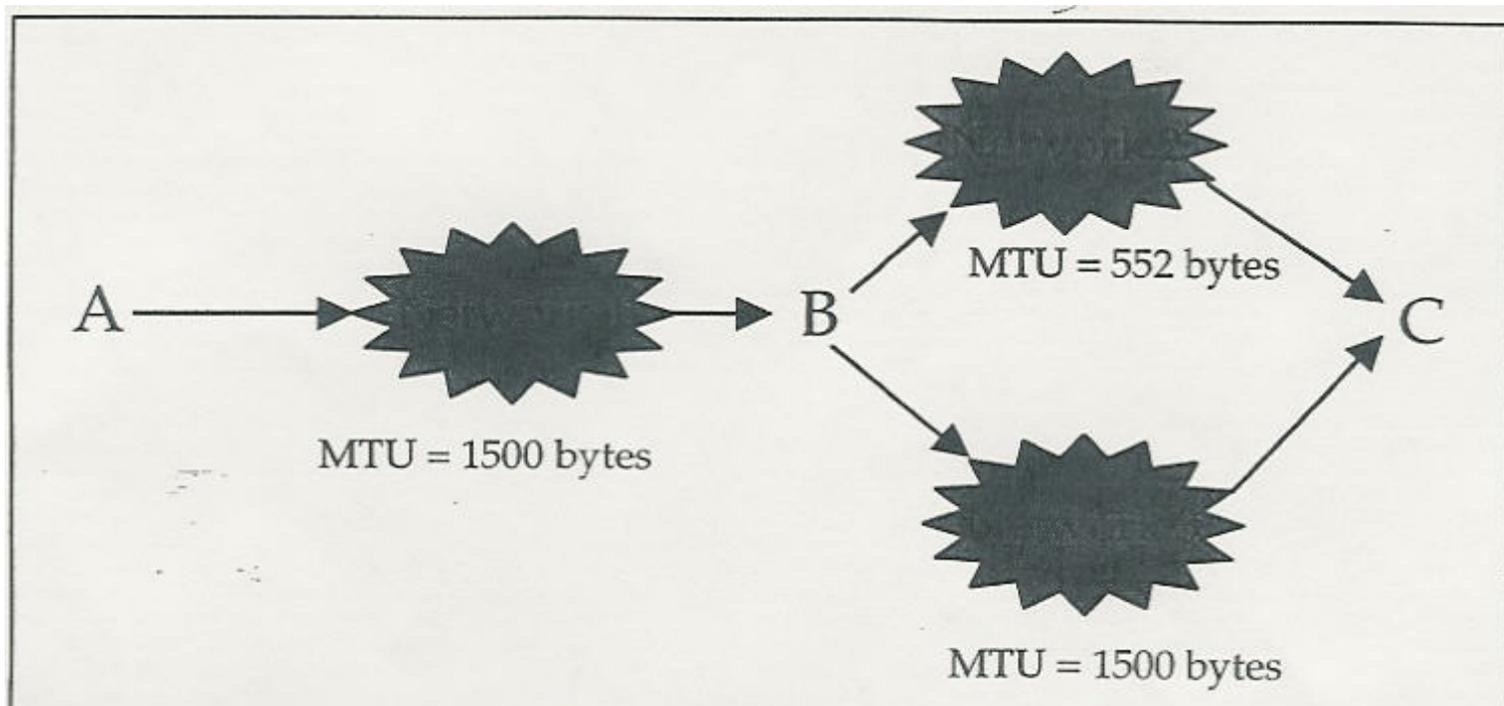
SECTION C: Multiple choices

There are 5 questions in this part of the exam. You are asked to circle the most appropriate answer for each quesiton. For example, if c is the correct answer to the question, circle c. No mark is given to incorrect answer.

1. (4 Points)
Using **Go back N** retransmission startegy, if frame n-1, n, n+1, n+2 have been sent, frame n-2 has been successfully acknowledged, the ACK for frames n-1 and n are lost, but the ACK for frame n+1 arrives **before** the timer for n-1 expires.
a. the frame next expected by the receiver is n-1

b. the frame next expected by the receiver is n
c. the frame next expected by the receiver is n+1
d. the frame next expected by the receiver is n+2

2. (4 Points)

Using **Go back N** retransmission strategy, if frames n-1, n, n+1, n+2 have been sent, frame n-2 has been successfully acknowledged, the ACK for frames n-1 and n are lost, but t**he timer for n-1 expires before** the ACK for frame n+1 arrives at the sender.

a. The sender will retransmit frames n- 1, n, n+1, n+2
b. The sender will continues as normal
c. The sender will retransmit frame n-1 only
d. The sender will not retransmit any frames

3. (4 Points)

With Selective Repeat protocol, if the number of bits for sequence number is N bits

a. The maximum window size 1
b. The maximum window size is 2^N -1
c. The maximum window size is N
d. The maximum window size is (2^N)/2

4. (4 Points)

The term piggy backing applied to data link protocols referes to

a. The incorporation of acknowledgements in data frames
b. The ability to concatenate multiple data frames
c. An error control technique
d. None of the above

5. (4 Points)

In the Internet, suppose that 5 datagrams belonging to the same message are sent from a source to a particular destination. The datagram can

a. each datagram can arrive at the destination following different path
b. the datagram can arrive at the destination out of order
c. all datagrams are independent from one another
d. all of the above