Department of Computer Science   Student ID_____

The Hong Kong University of Science and Technology

COMP 361 Computer Communications Networks

Fall Semester 2002

Midterm Examination 1

Date: October 10, Time 16:30pm : 17:50pm

Instructions:
1. This is a closed book exam
2. This examination paper consists of 5 pages and 8 questions
3. Please write your name, student ID and Email on this page.
4. For each subsequent page, please write your student ID at the top of the page in the space provided.
5. Please answer all the questions within the space provided on the examination paper. You may use the back of the pages for your rough work.
6. Please read each question very carefully and answer the question clearly and to the point. Make sure that your answers are neatly written, readable and legible.
7. Show all the steps you use in deriving your answer, where ever appropriate.
8. For each of the questions assume that the concepts are known to the graders. Concentrate on answering to the point what is asked. Do not define or describe the concepts.

Question	Points	Score
1	10	
2	15	
3	15	
4	15	
5	15	
6	10	
7	5	
8	15	
TOTAL	100	

Answer the following true/false questions by circling either T or F (10 points)

(a) Connection oriented .transfer is usually unreliable.   T   **F**

(b) Connectionless service does not possess flow control .   **T**   F

(c) Video conferencing applications have approximately equal bandwidth requirements as the voice-only conferencing applications.   T   **F**

(d) WWW applications and file transfer applications require logical channels that guarantee that every message sent from the sender is received properly by the receiver.   **T**   F

(e) Packet switching uses statistical multiplexing.   **T**   F

(f) Fiber-optical link between Hong Kong and USA has the Round Trip Propagation delay less than 1ms.   T   **F**

(g) Every layered network architecture must have at least host-to-host communication layer and process-to process communication layer.   **T**   F

(h) Software which runs in network switches must minimize the number of times the memory is accessed during the processing of the packet.   **T**   F

(i) The ADSL (asymmetric digital subscriber line) bandwidth is dedicated rather than shared while HFC (hybrid fiber coax) network bandwidth is shared.   **T**   F

(j) HTTP servers listen for the clients' requests on protocol port 80..   **T**   F

2. Suppose within your Web browser you click on a link to obtain a Web page. Suppose that the IP address for the associated URL is not cached in your local host, so that a DNS look-up is necessary to obtain the IP address. Suppose that n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur a RTT of RTT1,…, RTTn. Further suppose that the Web page associated with the link contains exactly one object, a small amount of HTML text. Let RTT0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object? (15 points)

Answer: The total amount of time to get the IP address is:
RTT1+RTT2+….+RTTn
Once the IP address is known, RTT0 elapses to set up a TCP connection and another RTT0 elapses to request and receive the small object. The total response time is;

2*RTT0 + RTT1+RTT2+….+RTTn

3. Is it possible that an organization's Web server and mail server have exactly the same alias for a hostname (for example cs.ust.hk.)? . What would be the type for the resource record (RR) that contains the hostname of the mail server? (15 points).

Answer: Yes, an organization can have the same alias name for both its Web server and its mail server. An MX resource record type contains the host name of the mail server.

4. Generate the checsum for the following message. (15 points)

	DATA							
	C7	C6	C5	C4	C3	C2	C1	C0
Byte 1	0	0	0	0	1	1	1	1
Byte 2	0	0	0	0	1	1	1	1
Byte 3	0	0	0	0	1	1	1	1
Byte 4	0	0	0	0	1	1	1	1
checksum	1	1	0	0	0	0	1	1

b) If any two bits in *this* message in columns 0-6 are changed due to the noise burst, will the receiver be able to detect that error has happened?

Answer:yes

c) In general, if the words of the packet are mis-ordered would checksum be able to detect the error ?
-Answer: No.

5. .In this problem we consider sending voice from Host A to Host B over a packet switched network (for example , Internet phone). Host A converts on-the-fly analog voice to a digital 64-Kbps bit stream. Host A then groups the bits into 48-byte packets. There is one link between host A and B; its transmission rate is 1Mbps and its propagation delay is 2ms. As soon as Host A gathers a packet, it sends it to Host B. As soon as Host B receives an entire packet, it converts the packet's bits to an analog signal. How much time elapses from the time a bit is created (from the original analog signal at A) until a bit is decoded (as part of the analog signal at B)? (15 points)

    Answer: Consider the first bit in a packet. Before this bit can be transmitted, all of the bits in the packet must be generated. This requires:
    $(48x8)/(64x\ 10^3\ ) = 6msec$

    The time reuired to transmit the packet is:

    $(48x8)/(10x10^6)sec= 38.4\mu sec$

    propagation delay= 2ms.
    The total delay until decoding is
    $6msec+38.4\mu sec+2msec= 8.038msec$.

    6   Explain the difference between flow control and congestion control (10 points)
Answer: Flow control makes sure that neither side of a connection overwhelms the other side by sending too many packets too fast.

Congestion control helps prevent the Internet from entering the state of having too many packets. The congestion control works by forcing end systems to decrease the rate at which they send packets into the network during the periods of congestion.

7   Under which condition can the HTTP server send two different html files over the same TCP connection? Is it possible that one TCP segment (packet) carries two distinct HTTP request messages ?
. (5 points)

Answer: Two diffent web pages may be sent over same persistent connection. Yes, if the connection is persistent with pipelining.

8   A channel has a data rate of R=4kbps and a propagation delay of Tp=20ms. For which range of packet sizes does stop-and-wait give an efficiency of at least 50%? (15points)

Answer e= Tf/(Tf+2*Tp)=0.5
Tf=L/R, L=160