CS:352 FALL 17 Mid Term 1 Sample Student Name: RUID:

12 Questions: Question 1-8: 5 Points Each; Question 9-12: 15 Points Each.

1. List Five Layers of Internet Protocol Stack
2. Differentiate between circuit-switched network and packet-switched network
3. Differentiate between active FTP and passive FTP connection
4. List two Key Differences Between TCP and UDP
5. Explain Why the Stop and Wait protocol is effective for flow control but NOT very efficient
6. List Formulas for Smoothed Round Trip Time (SRTT) and Retransmission Timeout Interval (RTO)
7. List Four Flow Control Algorithms for UDP
8. Define a Congestion Window in a TCP Congestion Control Protocol

9. Suppose you click on a link to obtain a Web page in your Web browser. Assume that the IP address for the associated URL is not cached in your local host, and 7 DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT1,...,RTT7. If the Web page associated with the link contains a HTML referencing 5 very small objects on the same server, how much time it will take from when the client clicks on the link until the client receives 5 objects assuming (i) we use Persistent HTTP connection with pipelining or (ii) we use non-persistent HTTP with 2 parallel connections?

10. A TCP connection is established between two hosts A and B connected over 4 links in tandem. The bandwidth of the first link is 1 Mbps (bps=bits per sec, M = 106), and the bandwidth of the next 3 links is ½ of the previous link. What is the maximum bandwidth of the connection?

11. Consider the GO back N protocol with a sender window size of 3 and a sequence number starting from 1. At some time t, the receiver sends an acknowledgment for 6 (received all packets up to 6). What are the possible sequence numbers of packets in the sender's window at time t?

12. A TCP connection with a flow control window of 40 packets uses slow start with a minimum congestion window of 2 with ss_thresh=40. How many RTTs are required to send 25 packets (with sequence number 1 through 25), assuming packet with sequence number 6 is lost and retransmitted. No other packets are lost.