Indian Institute of Engineering Science and Technology, Shibpur

B.Tech. (CST) 6th Semester Mid-Term Examination, March 2022

Subject: Digital Communication & Computer Networks (CS - 3202)

Time: 45 minutes **Full Marks: 30**

Answer *all* Questions
(Write all parts of the same question together)

1. Suppose a link is of 100 bps speed and the data packets that are transferred over that link are 100,000 bits long. To establish connection over that link by three-way handshaking, a certain number of control packets of 200 bits long are exchanged. Assume that the link supports *N* parallel connections each get *1/N* of the speed.

   Now consider that a user visits a website and wants to download a webpage that is 100 Kbits long over the mentioned link. The downloaded webpage contains 5 referenced objects. Compute the response delays the user experiences if his/her browser supports (a) non-persistent HTTP connection, (b) persistent HTTP connection (You should consider the connection establishment delay and can ignore the propagation delay between the user and the website). **[4 + 4 = 8]**

2. Assume TCP Reno is used as the transport layer protocol and the following events happened during the transmissions taken place in an observed interval [0, 24]:

   (i) Slow start state in the interval [0, 5]; (ii) Congestion avoidance state in the interval [6, 16]; (iii) Tripe-duplicate acknowledgement segments received at 17th transmission round; (iv) Congestion avoidance state in the interval [18, 22]; (v) Segment loss occurred at the 23rd transmission round. Answer the following (with brief reasons) in the context of on the abovementioned events:

   a. How did *cwnd* grow in the interval [0, 5] and what was its size after 5th transmission round? **[1+2]**
   b. What was initial the value of *ssthresh*? **[2]**
   c. How did the *cwnd* grow in the interval [6, 16] and what value it attained? **[1 + 2]**
   d. After event (iii) happened, what was the updated values of *ssthresh* and *cwnd*? **[2 + 2]**
   e. At 23rd transmission round, what was the new value of *cwnd*? **[2]**

3. Write short notes of the following (*any* two): **[4+4 = 8]**
   a. Web cache
   b. Network topologies
   c. Virtual circuit network
   d. DNS records
   e. Datagram fragmentation and reassembly