DOE - 31/8/16.

B. Tech
CN, IT 3001
[CSE & IT]

Mid-Semester Examination – 2016

COMPUTER NETWORKS

[IT 3001]

Full Marks: 25 Time : 2 Hours

(Answer any 5 questions, including Question no. 1)

1. Answer all the questions [1*5]
   i. In TCP, if the value of HLEN is 1011, explain how many bytes of options are included in the segment?
   ii. When an HTTP client receives a response message from an HTTP server, how does the client knows when all the headers have arrived and the body of the message is to follow.
   iii. Consider transferring a file of L bytes from Host A to Host B. What is the maximum value of L such that TCP sequence numbers are not exhausted.
   iv. Can a given destination port be associated with more than one TCP connection? If so, explain the same.
   v. Which one is a stronger sign of congestion i.e. timeout or three duplicate ACKs. Explain the reason for the same.

2. a) Mention the important records maintained by various DNS servers and describe the functionality of each of these records. State which type of records are maintained particulaly by authorative and non-authorative DNS servers along with the content of these records through an example? [3]

   b) Suppose N packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length L bits and the link has transmission rate R bps. What is the average queuing delay for the N packets? [2]

3. a) Explain, the messages exchanged during connection tear down through diagram. In TCP, assume the server initiates the connection tear down. In this scenario, state whether the client or the server enters into TIME_WAIT state and why in the TIME_WAIT state it will remain for 2MSL. [3]

b) Assume TCP is currently in "slow start" state and describe under what scenario TCP will enters into "fast recovery" state. Being in the "fast recovery" state it receives a new ACK then describe how it is going to handle this scenario. [2]

4. a) If you are designing a Selective Repeat protocol with bandwidth of 100 kbps and has a one way delay of 4 seconds. Assuming each packet carries 1 KB of data, what is the minimum number of bits you need for the sequence number? [3]

   b) Describe at least two reasons, why an application developer might choose to run an application over UDP rather than TCP. [2]

5. a) A 20 Mbps satellite link has a propagation delay of 400 microsec. The transmitter employs the 'go-back-n ARQ' scheme with n set to 10. Assuming each packet is 100 bytes long. Calculate the maximum data rate possible? [3]

   b) Compare and contrast TCP/IP model with OSI reference model. [2]

6. Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 120. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 50 bytes of data, respectively. Host B sends an acknowledgement whenever it receives a segment from Host A.

   i. If the first segment arrives before the second segment, what is the sequence number in the arriving segment? what is the acknowledgment number in the acknowledgement for the first arriving segment? [2]

   ii. If the second segment arrives before the first segment, in the acknowledgement for the first arriving segment, what is the acknowledgmentc number? [1]

   iii. Suppose the two segments sent by A arrive in order at B. The first acknowledgement is lost and the second acknowledgement arrives after the first timeout interval. *Draw a timing diagram*, showing these segments and all other segments and acknowledgements sent. (Assume there is no additional packet loss.) For each segment in your figure, provide the sequence number and the number of bytes of data; for each acknowledgement that you add, provide the acknowledgement number. [2]