Computer Networks
2nd Year, 1st Semester

TCP - Tutorial 8 – Sample Answers

1. IP is responsible for _____ communication while TCP is responsible for _____ communication.

   a) host-to-host; process-to-process
   b) process-to-process;Host-to-host
   c) process-to-process; network-to-network
   d) network-to-network; process-to-process

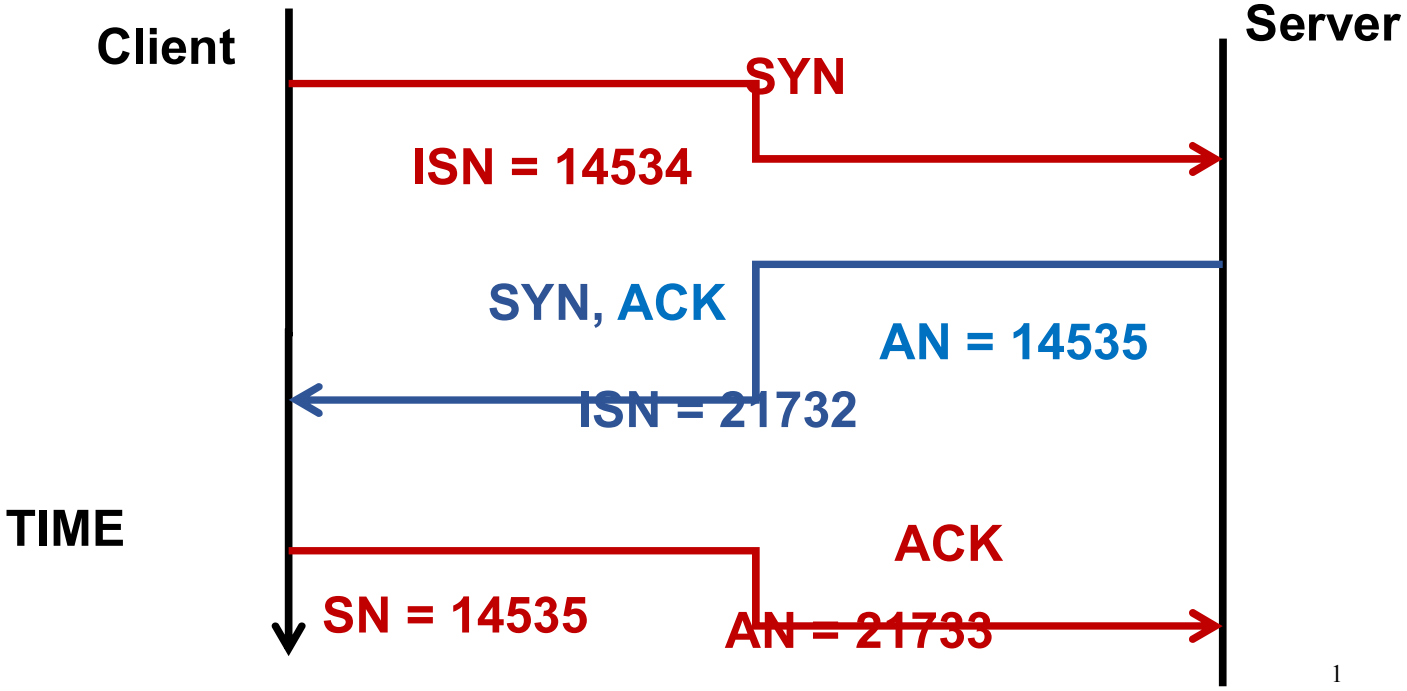
2. A host can be identified by _____ while a program can be identified by _____.

   a) An IP address; a port number
   b) A port number; an IP address
   c) An IP address; a host address
   d) An IP address; a well-known port

3. The _____ address **uniquely** identifies a running application program.

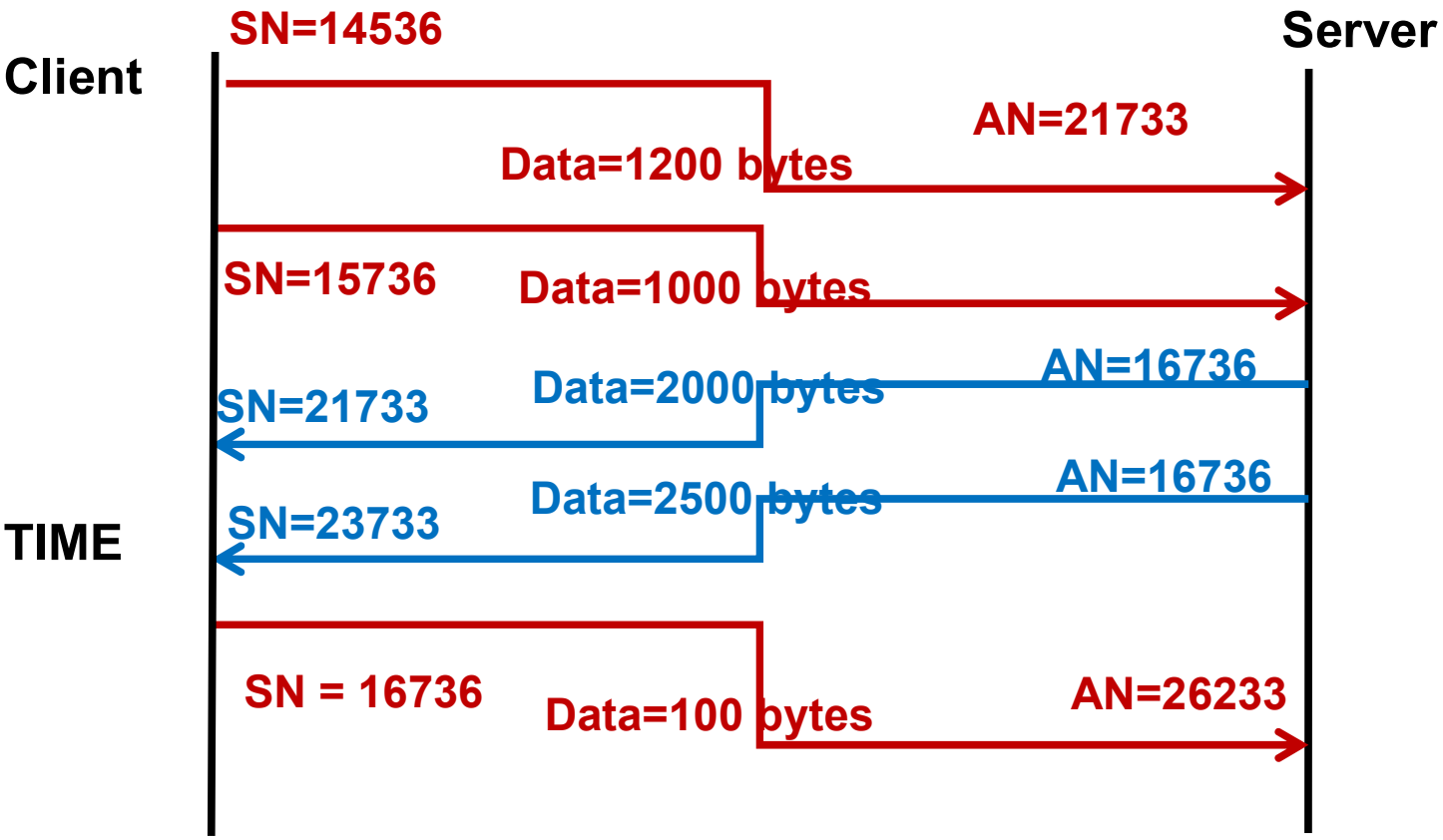
   a) IP address
   b) Host
   c) NIC
   d) Socket

4. A TCP client opens a connection with a server using an initial sequence number (ISN) of 14534. The server opens the connection with an ISN of 21732. Show the three TCP segments during the connection establishment.State the sequence number and the acknowledgement number as well.

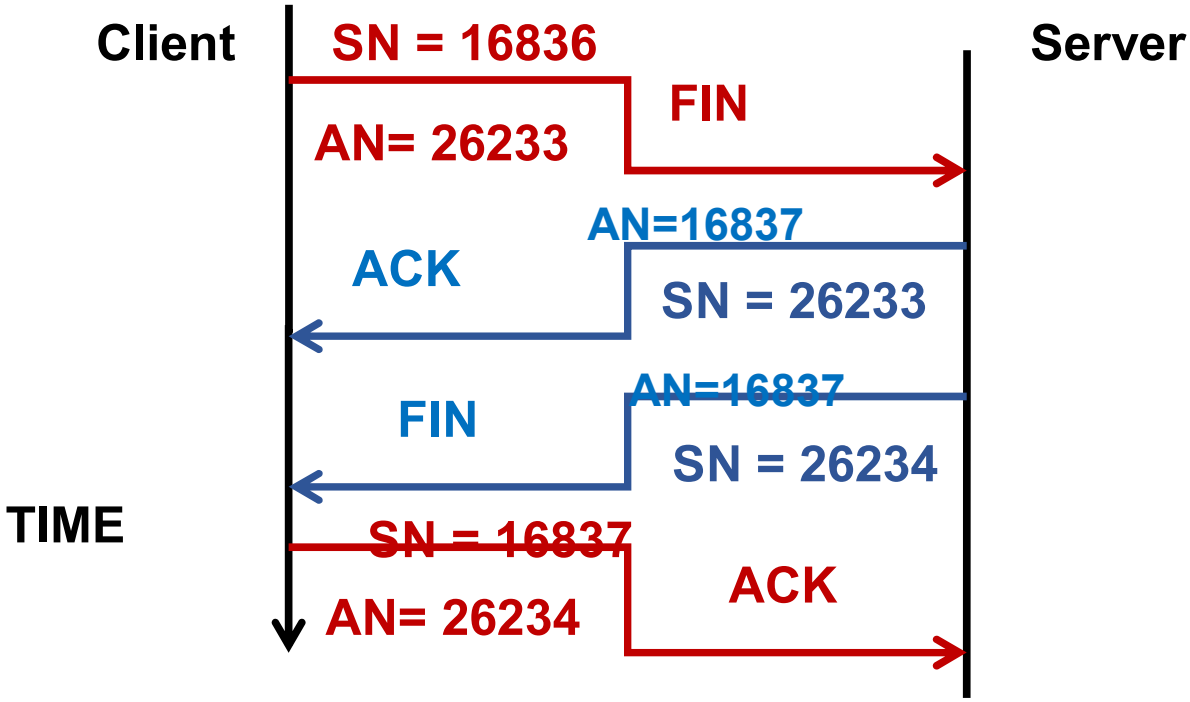


5. Following the previous exercise, show how the following segments are sent by the client and the server. State the sequence number and the acknowledgement number.

Client	Server
1200 Bytes	
1000 Bytes	
	2000 Bytes
	2500 Bytes
100 Bytes	



6. Following the previous exercise, show the segments transferred during the connection termination. State the sequence number and the acknowledgement number as well.



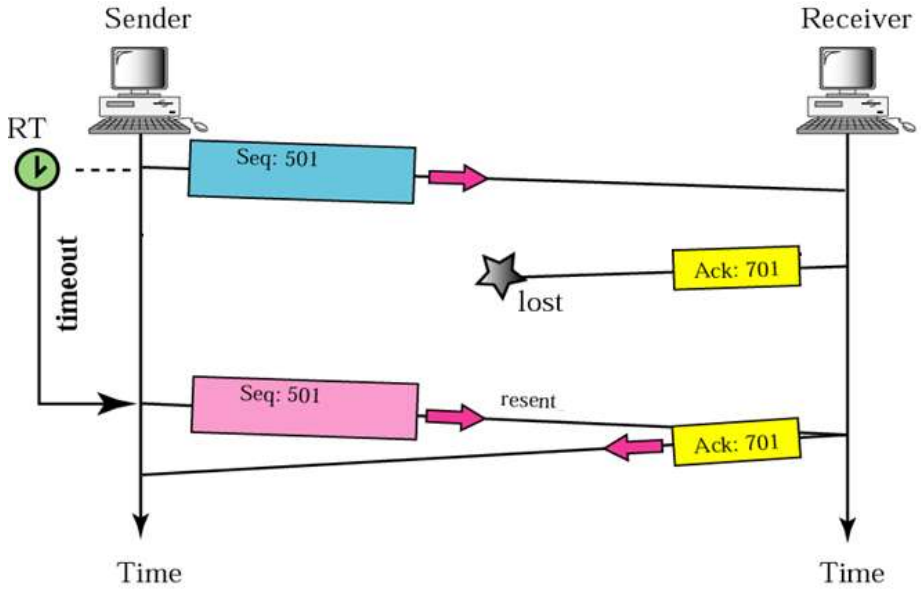
7. Following the previous exercise, assuming that the server is a Telnet server, show the entries for the header of the 'FIN' TCP segment that is transmitted from the client. Length of the TCP header is 32 Bytes. Fill the checksum field with 0s.
   FIN flag is set to 1
   Destination port number is 23
   HLEN value is 8

8. Is 'piggybacking' used in any of the segments transferred in question no.7, 8 or 9? Write the sequence numbers of the segments where piggybacking is used.
   Yes
   Server to client 21733
   Client to server 16736

9. Which two fields are necessary to indicate that the data in a particular segment is urgent? URG flag and urgent pointer

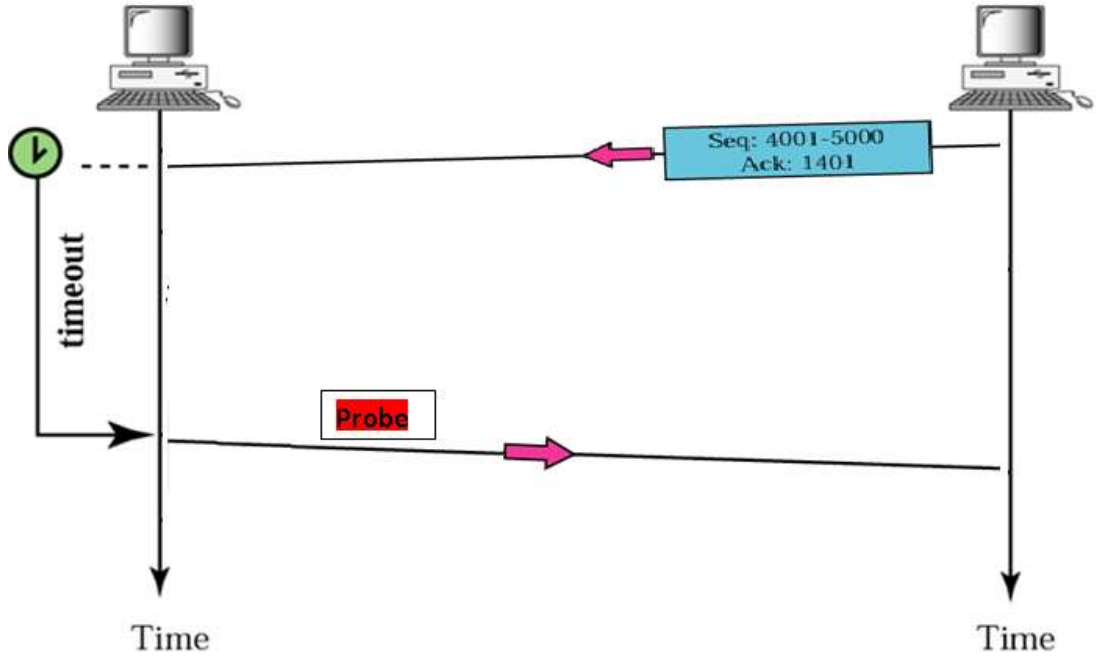
10. Describe the Retransmission timer and the Keepalive timer.
    Retransmission timer

- This timer starts after sending a segment
- If the acknowledgement is not received before this timer expires, the same segment is re-transmitted, and the timer is reset
- If the acknowledgement is received before retransmission timer expires that timer will be destroyed (Timer will be stopped)



Keepalive timer

Keepalive timer is used to find out whether other party is alive or not.After receiving some information from the other party the keepalive timer will start,it will restart only after hearing again from the other party.If didn't hear from the other party until the timer expires,a probe will be send to the other party to check for liveness if won't still hear the connection ill be terminated.



11. TCP sends a segment at 5:30:20. It receives the acknowledgement at 5:30:25. What is the new value for RTT if the previous RTT was 4 seconds?

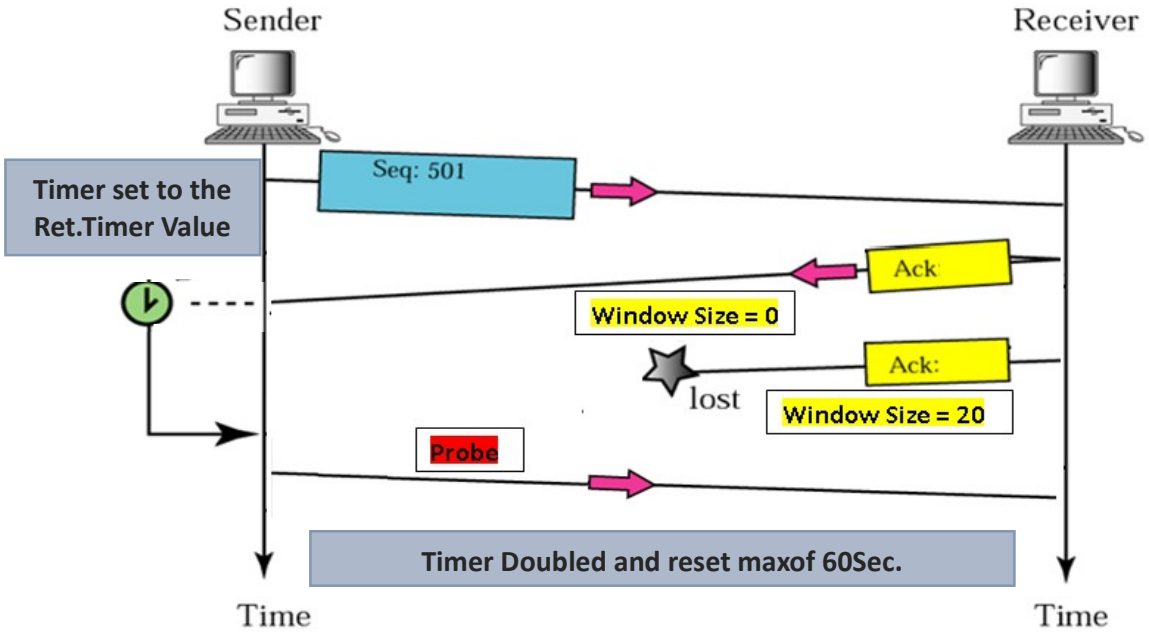
Setting RTT= 0.9 x Previous RoundTT+ 0.1 Current RoundTT
=0.9x4+0.1(5:30:25 – 5:30:20)
=3.6+0.5=4.1

12. A client uses, TCP to send data to a server. The data is 16 Bytes. Calculate the efficiency of transmission at the data link layer (ratio of useful bytes to total bytes). Assume no options for the IP header and use Ethernet at the data link layer.
    Useful data/total data
    Useful data/(useful data + TCP header size + IP header size + Ethernet header size)
    16/(16+20+20+18)
    16/74 = 0.22

13. A TCP connection is using a window size of 10000 bytes and the previous acknowledgement number was 22001. It receives a segment with acknowledge number 24001. Draw a diagram including the window size.
    Assume currently the window is full with 10000 bytes of data.
    Amount of data acknowledged = (24001 – 22001) = 2000 bytes
    The window will be free from 2000 bytes of data, therefore now the window will have 8000 bytes of data.

14. What timer is used to handle the zero window-size advertisement? Explain.
    Persistence timer

    After receiving a zero-window size advertisement the persistence timer will start. If non zero window size advertisement is not received until the timer expires, probe will be sent to the other party to get a non-zero window size advertisement.



15. Give an example to show how TCP overcomes the problems with corrupted segments, out-of-order segments and duplicate segments.

    Corrupted segment – If received segment is corrupted it will be discarded and negative acknowledgement will not be sent.So the sender will re-transmit after the re-transmission tier expires.

Out -of-order segments - The IP packets can travel through different routers.Therefore the segments can reach the receiver TCP layer out of order.The TCP layer waits until previous segment(s) are received and then acknowledges

Duplicate segments - If IP packet travels through a long way the retransmission timer expire and sender retransmit the same segment.The receiver receives both segments.If the first segment received has no errors, it is accepted and acknowledged.The second segment is ignored by the TCP layer

16. Show how a client process goes through the different states as it establishes a connection with a server and exchanges data from the start point.
17. Show how a server process goes through the different states as it establishes a connection with a client and exchanges data from the start point.
18. Show how a client process goes through the different states as it terminates the connection with a server.

19. Show how a server process goes through the different states as it terminates the connection with a client.

Answer for question 16,17,18,19