I Semester 2018-2019
CSE 4030 Computer Networks - 2
Midsem Examination

Total: 40 marks **Max Duration: 2 Hours**
Weightage: 20 marks **Date: 31 Jan 2019**

Notes: 1*. Give your answers for Part-A questions on question paper itself.*
2. *Remember to right your roll no. and the name below. Submit your question paper and answer book.*
3. *Answer Part-B and Part C questions on the answer book given. If diagrams are not drawn clearly, no marks will be awarded. This is a closed book examination.*
4. Mention assumptions if any, no additional clarifications will be provided during the examination.

Roll Number: **Name:**

PART – A (1 Mark each)

Instructions: a) *Choose the one most suitable option for all* **[20 * 1 = 20 Marks]**

1. Choose the reason for a network with the subnet mask 255.255.255.254 not being useful:
A. It allows only to have one valid host on its network
B. It allows only to have two valid hosts on its network
C. It allows only to have maximum of 254 valid hosts on its network
D. None of the given options are correct.

2. The number of valid hosts that can be on a /25 subnet is:
A. 125
B. 126
C. 127
D. 128

3. Assume a webserver running on a machine has multiple TCP connections with an another client machine. All the connections are established with the HTTP port 80. If you go through all the sockets of the connections on the webserver with the same client machine, which of the following entries will be different in each of those connections.
A. Server IP address
B. Client IP address
C. Server Port ID
D. Client Port ID

4. Well-known Server Port IDs are in the range of:
A. 0 to 123
B. 0 to 1023
C. 0 to 1024
D. 1024 to 65,535

5. One of the reasons for allotting well-known port IDs to the Server applications is :
A. Server applications cannot use other Port IDs.
B. Server applications have to initiate connections with different client applications.
C. Client applications have to initiate connections with various server applications.
D. None of the given options are correct.

6. Choose the TCP packet that does not consume a Sequence number.
A. SYN packet
B. FIN packet
C. ACK packet
D. All the given options are correct.

7. A machine receives a TCP segment with an Acknowledgement number value set to 234 on a TCP connection. It means that the sender of that TCP segment:
A. Has received up to the data corresponding to the sequence number 232
B. Has received up to the data corresponding to the sequence number 233
C. Has received up to the data corresponding to the sequence number 234
D. None of the given options are correct.

8. TCP checksum includes the pseudo header also for the following reason(s).
A. The TCP data is not corrupted.
B. The TCP segment is indeed from the original sender of that segment.
C. The TCP segment is not fragmented on its way.
D. All the given options are valid.

9. Just after the connection is established, before any data is transmitted, the host on one side of a TCP connection can know about the full size of the Rx buffer of the other end by reading the value of:
A. The first Acknowledgement number it receives from the other end
B. The first Sequence number it receives from the other end
C. The first Window size it receives from the other end
D. None of the given options are correct

10. Choose the one correct statement below about the changes happening to the TCP header elements of a particular connection over the time.
A. Sequence number will always be increasing
B. Acknowledgment number will always be increasing
C. Both the Sequence number and the Acknowledgement number will always be increasing
D. None of the given options are correct.

11. Window size element of a TCP header is related to:
A. Flow control
B. Congestion control
C. Error control
D. None of the given options are correct.

12. Choose the correct option about the Urgent data transmission in a TCP connection:
A. Urgent data can be sent even if the window size of the receiver is zero
B. Urgent data cannot be sent unless the window size of the receiver is larger than or equal to the Urgent data size
C. Urgent data cannot be sent if there is no space in the Tx buffer of the sender
D. None of the given options are correct.

13. TCP stack can remain in the FIN_WAIT_2 state indefintely after receiving the ACK from the other end for the FIN message it had sent:
A. Waiting for the FIN message from the other end
B. To receive an ACK in response to its ACK message
C. For the application on its end to consume the data on its Tx buffer.
D. None of the given options are correct.

14. IP Fragmentation of TCP segment cannot be avoided if there is a link on the way to the other end of the TCP connection, which has a smaller MTU than the MSS aligned between the hosts, if:
A. ICMP is not supported by the router connecting to the smaller MTU network.
B. Sliding window is not supported by one of the hosts of the connection.
C. The same OS is not running on both the hosts of the connection.
D. None of the options given are correct.

15. The IP address to which a TCP segment is to be transmitted, is:
A. Given by the layer which is below the IP layer
B. Given by the TCP layer which is above the IP layer
C. Found out by the IP layer itself
D. None of the given options are correct

16. The ACK for a TCP segment may be generated by the TCP layer at the receiving end:
A. Only after the application at the receiving end consumes the data received
B. Once the data is received correctly and stored in the Rx buffer of the TCP stack
C. Once the IP layer receives the IP packet in which the TCP segment is part of
D. Once the DL layer receives the frame in which the TCP segment is part of

17. Quiet time in the TCP is the time for which:
A. There is no data flowing in a TCP connection
B. There are no ACKs coming from the other end
C. The Sequence number is not changing in both the directions
D. None of the given options are correct

18. Abortive release of a part of a TCP connection happens when a:
A. FIN message is received with the URG flag set from one of the hosts
B. FIN message is received with the PSH flag set from one of the hosts
C. RST message is received from one of the hosts
D. None of the given options are valid

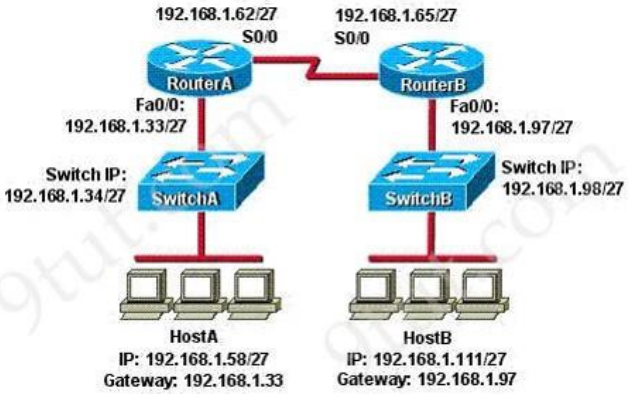
19. Silly window problem refers to:
A. Under utilization of network infrastructure
B. The TCP data size getting transmitted going below the final MSS value
C. Tiny TCP segments (lower than MSS) getting into the network because of early transmission of TCP segments
D. All the given options are correct

20. "Do not fragment" (DF) bit is an element in the:
A. Ethernet header
B. IP header
C. TCP header
D. UDP header

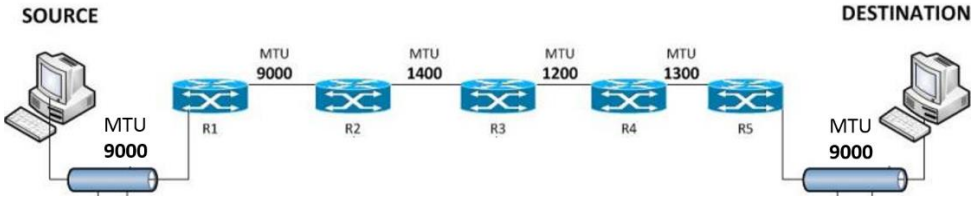
PART – B [10 marks]

Instructions: a) Use ***your answer book*** *for* ***answering these questions.*** **[5 * 2 = 10 Marks]**

21. Give the following, using VLSM method for each of the networks, without wasting addresses.
a) Subnet masks in CIDR notation and
b) The number of IP addresses used up by the existing elements in each of the networks.
Note: Ignore the interface names of the routers mentioned, for example Fa0/0, S0/0, etc.

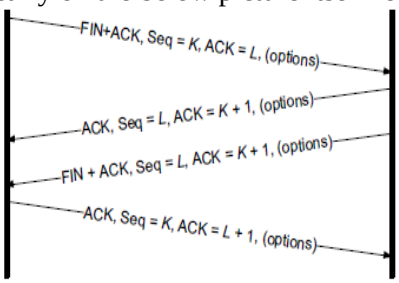


22. Assume PMTUD is done below when the source host sends a TCP segment of size 9000 bytes. If all the routers enroute are capable of generating "Destination Unreachable" message, answer the following questions.
a. How many ICMP messages would be generated back to the source before a TCP segment finally reaches the destination without getting fragmented?
b. What would be the final MSS set at the source?



23. Draw the message sequence diagram of a three-way handshake between two Hosts A and B while establishing a TCP connection.
Mention the relevant control flags, SEQ and ACK numbers along with each message.
Assume ISN of Host A is 'x' and Host B is 'y', and the Host A is the client initiating the connection.

24. Mark the place on the timeline of both the hosts, where the respective applications might have sent a connection close() message to their respective TCP/IP stacks.
Note: You can mark it clearly on the below picture itself for both the hosts.



25. Explain briefly Sliding Window protocol with an example and a suitable diagram.

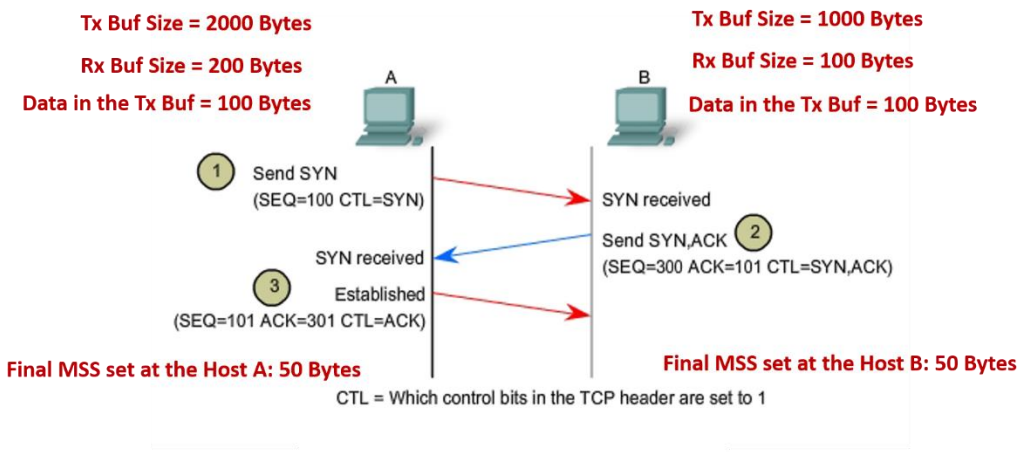
PART – C [10 marks]

Instructions: Use *your **answer book** for answering these questions, wherever relevant.*

[2 * 5 = 10 Marks]

26. The connection establishment between hosts A and B is as shown below. The buffer parameters and MSS values at each host at time = 0 are also given below.
The following events happen after time = 0.

a. After the connection establishment the Host B transmits the data first.
b. Host B transmits next data only after it receives the ACK from Host A, for the pervious data it sent.
c. Host A transmits any data only when there is no data in transit from Host B.
d. Host A while acknowledging the data from Host B, it also sends its own data if available along with the ACK.
e. At any time, only one TCP segment is in transit between the Hosts A and B.
f. Assume any data sent by both the hosts are received at the other end without any error or loss.
g. Assume, the applications at both ends do not interact at all, with their respective TCP/IP stacks, after the below data were loaded prior to the time = 0.

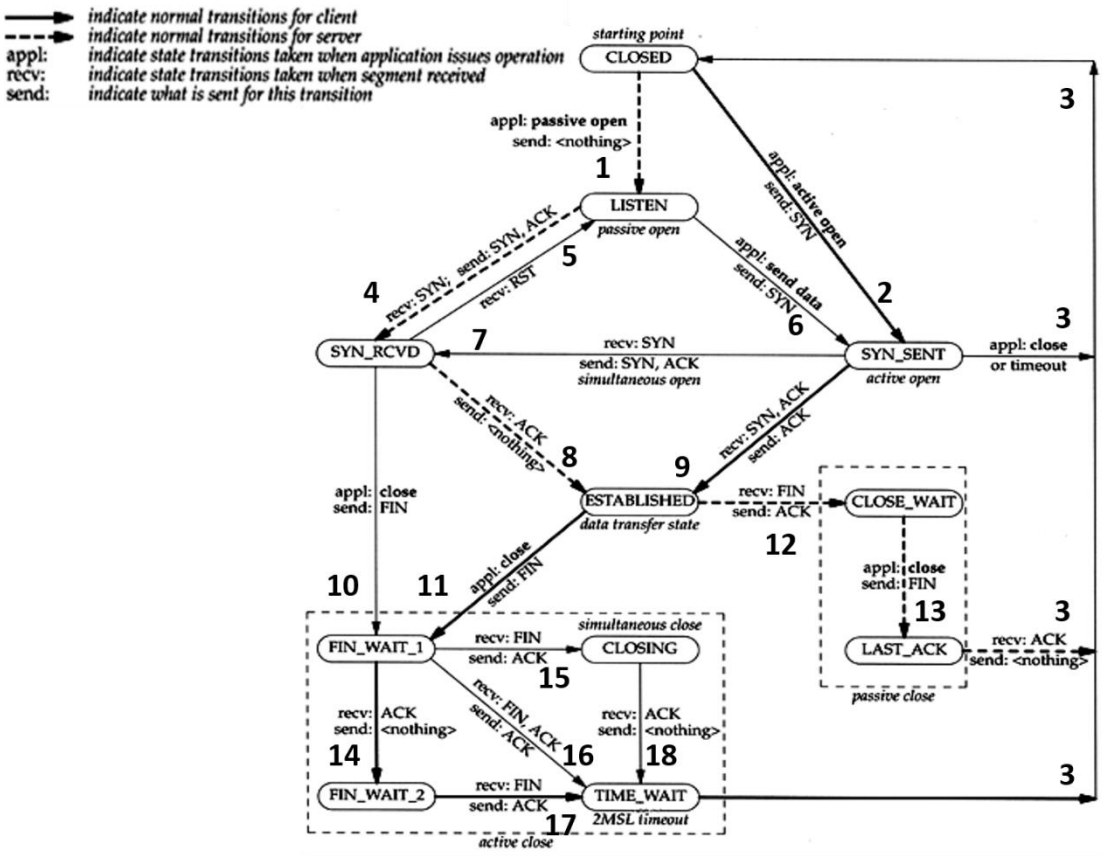


Give the following header values of **every TCP** segment that gets **transmitted** between the hosts in the **time order**, starting **from time = 0**, till all the data at the hosts get transmitted.
Apart from TCP data segments transmitted, include any other ACK segments sent without any data as well.
Mention the direction of each TCP segment, either from Host A to B or Host B to A.

i. Sequence number
ii. Length of TCP data transmitted
iii. Acknowledgement number
iv. Window size
v. Any associated control bits which are set

Q27 is on the next page

27. Fill in the transition numbers that each event would trigger. You can use the table below on the question paper itself to fill in your values corresponding to the events mentioned.
Note: The transition numbers are mentioned close to the respective arrow ends of the transitions.



Event	Transition Number
Application initiating a connection Request	
Starting the Server to wait for client requests on its port	
Active close done by an application that initiates a FIN message	
The connection end which enters the ESTABLISHED state first	
The application closing the connection later than the other end	
The side waiting for the other end to close the connection after receiving the ACK from the other end for its own FIN message	
The Server on receiving a SYN from the client	
The connection end which enters the ESTABLISHED state later than the other end	
Receiving ACK from the Client for its own SYN message during connection establishment	
The side which closes its side of the connection later, receiving the ACK for its FIN message	

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