


National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	Computer Networks	Course Code:	CS 3001
	Program:	BS (Software Engineering)	Semester:	Spring 2023
	Duration:	20 minutes	Total Marks:	15
	Paper Date:	22-March-2023	Section	6A
	Exam Type:	Quiz 3 - Chapter 3	Page(s):	2

Student Name

Roll No.

Section:

Q1. Encircle the correct option:

[5 marks –CLO2]

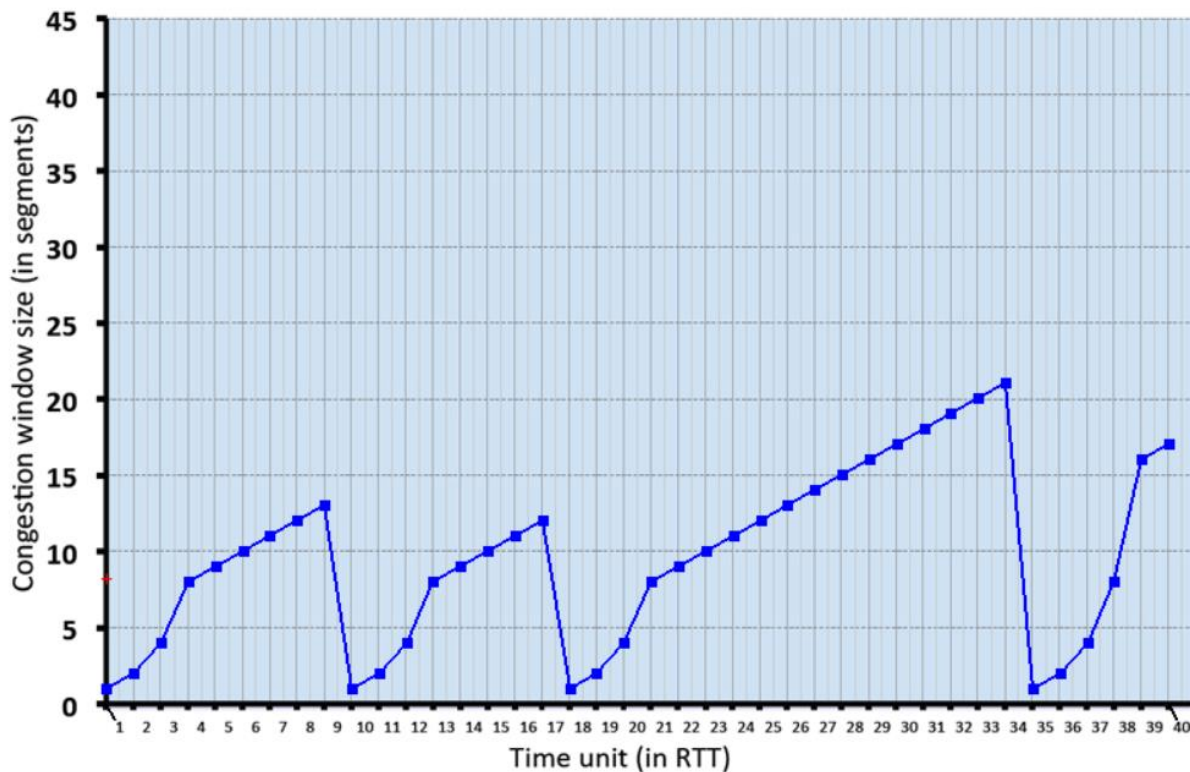
- Pipelining requires which of the following
 - transmitting many packets before receiving acknowledgements
 - unique sequence numbers for each in-transit packet
 - sender-side buffering of unacknowledged packets
 - all of the above
- In a TCP connection, suppose that loss occurs whenever the window size of a connection hits W . Also suppose that the RTT is constant. Then the approximate average transmission rate is
 - MSS/RTT
 - $W * MSS / 2 RTT$
 - $W * MSS / RTT$
 - $.75 W * MSS / RTT$
- UDP has which of the following characteristics:
 - three-way hand shake for connection establishment
 - connection state at the server
 - regulated send rate
 - none of the above

True/False:

- The size of the TCP RcvWindow never changes throughout the duration of the connection. [T / F]
- The MSS is the maximum size of a TCP segment including headers. [T / F]

Q2. Consider the figure below, which plots the evolution of TCP's congestion window at the beginning of each time unit (where the unit of time is equal to the RTT). In the abstract model for this problem, TCP sends a "flight" of packets of size cwnd at the beginning of each time unit. The result of sending that flight of packets is that either (i) all packets are ACKed at the end of the time unit, (ii) there is a timeout for the first packet, or (iii) there is a triple duplicate ACK for the first packet. In this problem, you are asked to reconstruct the sequence of events (ACKs, losses) that resulted in the evolution of TCP's cwnd shown below.

[10 marks – CLO2]



- Give the times at which TCP is in slow start.
- Give the times at which TCP is in congestion avoidance.
- Give the times at which TCP is in fast recovery.
- Give the times at which packets are lost via timeout.
- Give the times at which packets are lost via triple ACK.
- Give the times at which the value of ssthresh changes.