

National University of Computer and Emerging Sciences, Lahore Campus

	Course: Computer Networks Program: BS (Computer Science) Due Date: 22 nd October, 2025 Section: J Quiz # 3	Course Code: CS3001 Semester: Fall 2025 Weight Roll No. Name
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Q1: Consider a TCP connection between a sender and a receiver. The sender's initial congestion window size (cwnd) is set to 4 MSS (Maximum Segment Size), and is in slow start phase and the congestion threshold (ssthresh) is set to 16 MSS. After reaching the threshold it enters the congestion avoidance phase. The round-trip time is measured to be 150 ms. However, during the 2nd RTT of congestion avoidance, a packet loss due to timeout occurs, and the sender enters the slow start phase and new threshold is calculated. Please answer the following questions: [CLO 2] [2+2+2+2+2]

(i) Time Taken to reach initial threshold:

$$2 \times 150 = 300 \text{ ms}$$

(ii) Time Spent in Congestion Avoidance:

$$2 \times 150 = 300 \text{ ms}$$

(iii) New Threshold:

$$\frac{17}{2} = 8.5 = 8 \text{ MSS}$$

(iv) Time Taken to reach new threshold:

$$3 \times 150 = 450$$

(v) Total Time Consumed:

$$300 + 300 + 450 = 1050 \text{ ms} = 1.05 \text{ seconds.}$$

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Q1: Consider a TCP connection between a sender and a receiver. The sender's initial congestion window size (cwnd) is set to 3 MSS (Maximum Segment Size), and is in slow start phase and the congestion threshold (ssthresh) is set to 24 MSS. After reaching the threshold it enters the congestion avoidance phase. The round-trip time is measured to be 200 ms. However, during the 4th RTT of congestion avoidance, a packet loss due to timeout occurs, and the sender enters the slow start phase and new threshold is calculated. Please answer the following questions: [CLO 2] [2+2+2+2+2]

- (i) Time Taken to reach initial threshold:

$$\text{no. of RTTs in slow start} = 3$$

$$\text{Time} = 3 \times 200 \text{ ms} = 600 \text{ ms}$$

- (ii) Time Spent in Congestion Avoidance:

$$4 \times 200 \text{ ms} = 800 \text{ ms}$$

- (iii) New Threshold:

$$\text{cwnd at Time of Timeout} = 27 \text{ MSS}$$

$$= \frac{27}{2} = 13.5 = 13 \text{ MSS}$$

- (iv) Time Taken to reach new threshold:

$$800 \text{ ms}$$

- (v) Total Time Consumed:

$$(i) + (ii) + (iv)$$

$$600 + 800 + 800 = 2200 \text{ ms} = 2.2 \text{ s}$$