

National University of Computer and Emerging Sciences, Lahore Campus

Computer Networks (Code: CS3001)

Assignment 3 [Section BCS 5A-5B] Fall 2024

Due Date: Oct 22, 2024

Time: At the start of class

Marks: 85

Please note the following:

1. No exceptions to the above date and time will be allowed. Inability to submit the assignment by the required time will result in zero marks.
2. To ensure self-completion of assignments and discourage plagiarism, the instructor or the relevant TA may randomly contact you and ask for an explanation of your answers. Where plagiarism and/or cheating is evident, you will be referred to the departmental disciplinary committee. In extreme cases of plagiarism, an F may be awarded immediately with further referral to the university disciplinary committee.
3. All solutions must be **handwritten**.
4. **Assignment Solution Submission:** Each student will submit the hard copy of the handwritten assignment's solution to the Instructor / TA directly in case classes are conducted **on the campus (The current scenario)**. Otherwise, in the case of **online classes (exceptional scenario)**, handwritten assignments will be scanned into one PDF document and submitted online via **Google Classroom**. The file or folder name should contain your roll number and assignment number, i.e. (**##L-####_A#**). If you are making multiple submissions, write "Updated" at the end, i.e. (**##L-####_A#_Updated**).

NOTE: The final results of the answers should be properly highlighted.

Part I: Question from the book (65 Marks) [CLO 1]

Computer Networking - A Top-Down Approach 8th Edition by Kurose & Ross.
Chapter 3 Exercise Questions

Q1: Answer the following review questions (Chapter 3 Review Questions). Every Question has equal marks.
(5 x 3=15 marks)

Review questions: R6, R7, R9, R10, R11

Q2: Solve the following problems from the book Chapter 3 Problems. Every Question has equal marks.
(10x5=50 marks)

Problems: P3, P4, P5, P16, P26, P27, P31, P37, P51, P52

Part II: Solve the following by showing the necessary working: (10 x 2 = 20 Marks) [CLO 1]

Q1: Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first

and the second segments contain 80 and 40 bytes of data, respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A.

- a. What is the sequence number and destination port number in the second segment sent from Host A to B?
- b. If the first segment arrives before the second segment, then, in the acknowledgment of the first arriving segment by host B to A, what will be the acknowledgment number and the destination port number?
- c. If the second segment arrives before the first segment, then, in the acknowledgment of this received segment, what will be the acknowledgment number and source port number?

Q2: Suppose that TCP's current estimated values for the round-trip time (estimated RTT) and deviation RTT (Dev RTT) are 200 msec and 8 msec, respectively. Suppose that the next measured value of sample RTT is 200 msec. You are required to compute TCP's new value of estimated RTT, Dev RTT, and the TCP timeout interval after the measured RTT values is obtained. Use the values of $\alpha = 0.125$ and $\beta = 0.25$?