Computer Networks
Spring 2025
Assignment # 1 (6A & 6C)

Due Date: Thursday, 6th February, 2025
Submission Mode & Time: Handwritten solutions to be submitted during the lecture.

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 university disciplinary committee.

3. All solutions must be **hand-written.**

4. **Assignment Solution Submission**: In case of **in person / physical lectures at the campus**, hard copy of the hand-written assignment's solutions will be submitted by **hand** by each student to the Instructor / TA directly during the lecture on the due date.

PART-1

Use the following text for completion of this part of the assignment:
Computer Networking - A Top-Down Approach 8th Edition by Kurose & Ross.

Solve the following problems from the back of **Chapter 1**. Every Question has equal marksi.e.

Review Questions: **(4*4 = 16 marks)** **[CLO 1]**
R4, R11, R16, R19

Problems: **(4*3 = 12 marks)** **[CLO 1]**

P6 , P31, P20

PART - 2

Question1 [12 Marks] [CLO 1]

Consider the queuing delay in a router buffer. Let I denote traffic intensity; that is, I = La/R

. Suppose that the queuing delay takes the form IL/R(1 − I) for I < 1.

(a) Provide a formula for the total delay, that is, the queuing delay plus the transmission delay.

(b) Plot the total delay as a function of L/R.

Question2 [10 Marks] [CLO 1]

This problem explores throughput, another critical performance measure in computer networks. The throughput at any given time is the rate (measures in bits/second) a host is receiving a file. The average throughput is the transfer time (T seconds) for a file (F bits) = F/T bits/sec. Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links with the following rates: Link1 R1 = 500 kbps, Link 2 R2 = 2 Mbps, Link 3 R3 = 1 Mbps.

1. Assuming no other traffic in the network, what is the throughput for the file transfer?

2. Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

3. Repeat (a) and (b), but now with R2 reduced to 100 kbps.