Computer Networks
Spring 2025
Assignment#2 (6A & 6C)

Due Date: Thursday, 20th 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 2**. Every Question has equal marksi.e.

Review Questions: **(4*3 = 12 marks)** **[CLO 2]**

R6, R10, R11, R13

Problems: **(3*6 = 18 marks)** **[CLO 2]**

P1, P7, P13

PART - 2

Question1 [5*1Marks] [CLO 2]

Below is a server-to-client HTTP Response Message. Answer all parts (i) to (v) in the answer sheet.

```
HTTP/1.0 404 Not Found
Date: Tue, 07 May 2024 11:33:45 +0000
Server: Apache/2.2.3 (CentOS)
Content-Length: 258
Connection: Close
Content-Type: text/html
```

1. Was the server able to send the file (object) successfully?
2. Is the HTTP connection persistent or non-persistent?
3. What is the type of the file (object) being sent?
4. What is the size of the file (object) being sent in bytes?
5. What is the name & version of the server?

Question2 [5Marks] [CLO 2]

Consider sending over HTTP/2 a Web page that consists of one video clip, and five images. Suppose that the video clip is transported as 2000 frames, each of the first, second and third image have 5 frames, fourth image has 4 frames while fifth image has 3 frames. Note that "frame time" is the time needed to send out a frame. If frames are interleaved, then how many frame times are needed until all five images are sent?

Question3 [4Marks] [CLO 2]

A user is trying to visit a website **www.example.com**, but her browser doesn't know the **IP address**. Using an **iterative DNS query**, answer all parts (i) to (iv) in the answer sheet.

1. Where does the local DNS server check first? ***(****Where does it send the DNS query first?)*
2. Where does the local DNS server check next? *(Where does it send the DNS query next?)*
3. Where does the local DNS server check after that? *(Where does it send the DNS query next?)*
4. What type of DNS Record (RR) is returned in response to this DNS query?

Question4 [4+5 Marks] [CLO 2]

(i) Write all the general formulas of the following:

1. HTTP non persistent and non parallel
2. HTTP non persistent and parallel
3. HTTP persistent and non parallel
4. HTTP persistent and pipelined

(ii) Using these formulas, solve:

Consider a client-server scenario where a client needs to download a webpage consisting of a base HTML file of size 40 KB and 10 embedded objects, each of size 15 KB. The round-trip time (RTT) between the client and the server is 50 milliseconds, and the transmission rate of the link between the client and the server is 10 Mbps. Assume that for both non-persistent and persistent HTTP, it takes one RTT to initiate a TCP connection. Assume the server can send the data immediately once the connection is established. Note that transmission delay is not included in RTT.

(a) Calculate the total time it takes to download the entire webpage (base file and embedded objects) using non-persistent HTTP with no parallel connections.

(b) Calculate the total time it takes to download the entire webpage using persistent HTTP without pipelining.