# National University of Computer and Emerging Sciences, Lahore Campus

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| | **Course Name:** | Computer Networks | **Course Code:** | CL-307 |
| | **Program:** | BS(Computer Science) | **Semester:** | Spring 2017 |
| | **Duration:** | 120 Minutes | **Total Marks:** | 25 |
| | **Paper Date:** | 09-Nov-2019 | **Weight** | 20% |
| | **Section:** | ALL | **Page(s):** | 4 |
| | **Exam Type:** | Mid | | |

**Student : Name:**_____ **Roll No.**_____
**Section:**_____

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| **Instruction/Notes:** | **READ ALL INSTRUCTIONS CAREFULLY.** |

1. Understanding the question paper is also part of the exam, so do not ask any clarification. Make suitable ASSUMPTIONS.

2**.** Final Submissions should be done in your respective section folder on **\\sandata\Xeon\Fall 2018\COMPUTER NETWORKS LAB**. Each question related files must be in **separate folder (Question 1, Question 2)** and all the separate folders must be in a single zip file. **Zip file must be renamed after your roll number e.g., "14L-4125".Multiple submissions are not allowed(if done, only first one will be considered)**

3. Your cell phones/smart watches should be turned off and placed upside down.

4. It is your responsibility to protect your code and save it from being copied. If you don't protect it, all matching codes will be considered copy/cheating cases. **No leniency on plagiarism.**

5. Any kind of cheat sheet/code if found in your PC will result in immediate disqualification from Final Exam and '**F'** as final grade in Computer Networks Lab. So make sure you delete everything from Desktop of your windows as well as Ubuntu. Also delete all the files permanently from Recycle Bin and Trash respectively for Windows and Ubuntu. Delete all files from your Z Drives before starting the exam.

6. You are immediately disqualified from the exam if:

i. You are seen talking, whispering, borrowing or looking at someone's PC

    ii. A USB is found attached to your PC

    iii. You are seen using cell phone/smart watch.

    iv. You are caught accessing internet

## Part 1           TCP SOCKET PROGRAMMING    (Marks: 15)

**\*\*\*\*Submission: You have to submit your (Roll-No_Client.c) and (Roll-No_Server.c) files in a folder named Question 1\*\*\*\***

### Online Movie Ticketing system

You are to devise an online ticketing system using TCP multithreaded server-client program. The user can see movie names and their show time through client systems and book their ticket.

Whenever a client comes, the server will show a welcoming message on client's screen along with available movies in following way

-------------------------------------WELCOME to the Movie World-------------------------------------

In theaters:

[1] Donkey King

[2] Avengers

[3] Bohemian Rhapsody

[4] Halloween

[5] First Man

The client will select a movie by send movie number in reply along with number of ticket in following format.

2 4 i.e. book 4 tickets for movie Avengers.

One user can book many tickets. However, tickets should available. The server will check availability of movie and number of seats from file name "movieTicketsInfo.txt". If anything is not available print relevant message. In case of successful reservation, send total bill (assume ticket price for each show is same i.e. 500 per ticket) to user/client. Client will receive and display following message.

"Your Total Bill for the show Avengers is 2000.Rs"

"Press y to proceed or press n to cancel"

If user press "y", decrease number of tickets from "movieTicketsInfo.txt" file. After successfully decreasing number of tickets, the server will ask to enter the CNIC (assuming a 4 digit number). The server will save the data in "BookingRecord.txt" and will send a message "Reservation Done" or if any error occur then send message "Reservation cancel"

**Note:**

All clients are handled simultaneously but in Decrease ticket functionality only one client should allowed at a time. (Assuming only one client can alter ticket number)

| movieTicketsInfo.txt<br>5<br>1/Donkey King/500<br>2/Avengers/300<br>3/Bohemian Rhapsody/300<br>4/Halloween/400<br>5/First Man/500 | BookingRecord.txt<br>4<br>1990/2/4<br>6667/4/4<br>7865/4/6<br>5849/2/3 |
|---|---|

In BookingRecord.txt first line tells count of users. (Format: CNIC/Movie number/tickets)

In movieTicketsInfo.txt first line tells count of shows. (Format: Movie number/Name/Tickets)

## Part 2                          Wireshark Packet Analyzer                          (Marks: 10)

**\*\*\*\*Submission: You have to submit your (Roll-No.docx) word file in a folder named Question 2. You should provide proper explanation along with screen shots. Make your word file with a proper format indicating all the question numbers and the corresponding answers\*\*\*\***

**\*\*\*\*\*Use file Capture 1 for questions 1-2\*\*\*\***

1. Apply a capture filter to obtain all the packets that are either coming from a hardware address of 00:06:25:da:af:73 from TCP Port 80 or 00:08:74:4f:36:23 from TCP Port 4247. Write is the filter you applied? **[0.5]**

2. Suppose that we assign Number 1 to the first packet obtained after applying filter with each successive packet number increasing by one (2$^{nd}$ Filtered Packet will be called Number 2 and so on). Also suppose that after the HTTP response in Packet Number 6, someone replaced the recent data present on the server (gaia.cs.umass.edu) with another bogus data having 250 Bytes on 9 Nov, 2018. In that case, what would be the sequence number and acknowledgement number in Packet Number 10 if we would have applied the same HTTP get request as present in packet Number 8? Explain how you calculated the values? **[2.5]**

**\*\*\*\*\*Use file Capture 2 for questions 3-7\*\*\*\*\*\***

3. Apply a capture filter to obtain all the packets that are either going from client IP: 192.168.1.2 to server TCP Port: 21 or from server IP: 195.89.6.167 and server TCP Port: 20 or 21. Write the filter which you have applied? **[0.5]**

4. In the filtered packets, client asks for data from server over FTP connection for two times. Suppose that at the start of FTP connection, the first command was issued using Port No: 16979 and Source IP: 178.128.12.54. Now, if the client wants to get the data third time using the updated credentials, what will be the specific command for such a request made by the client to the server? [1.5]

5. In regard to the request made by client to server in question no. 4 what will be Destination Port and Destination IP in the response generated by the server? **[1]**

6. Apply a capture filter to get all the packets which are directed from client with MAC Address: 60:67:20:55:7b:ac to the Server UDP Port: 53. Write the filter you have applied? **[0.5]**

7. As the result of filter applied in question no. 6, if we take the first filtered packet as Packet No. 1 with each successive packet increasing one in number, then what will be the acknowledgement number and sequence number of the DNS request made in Packet No. 11? **[0.5]**

**\*\*\*\*\*Use file Capture 3 for questions 8-10\*\*\*\*\*\***

8. Apply a filter to obtain all those packets which are either going from client with IP:192.168.1.102 to server tcp port: 80 or from server with IP:128.119.245.21 to client tcp port: 1161. Write the filter you have applied? **[0.5]**

9. If we analyze the packets obtained after applying the filter, then we come to know that since the beginning, acknowledgement number in all the data packets remains at one while sequence number keep on increasing. Why is this so? **[0.5]**

10. If we look at the last acknowledgement packet in the filtered packets, then Seq=164091 and Ack=731. How come so that the Seq=1 from the second last acknowledgement packet has abruptly

converted into such big value in the last acknowledgement packet even when the total packet length (including headers) of last data packet is only 784 bytes? Why the Acknowledgement Number in the last acknowledgment packet has decreased so much only with the transmission of one data packet after receiving the second last acknowledgment packet? **[2]**