Course:	Computer Networks Lab	Course Code:	CL3001
Program:	BS(Computer Science)	Semester:	Fall 2023
Duration:	2 hours & 15 minutes	Total Marks:	40
Date	08-01-2024	Weight	40%
Section:	ALL	Pages:	03
Name:		Roll No.:	

Exam instructions: READ ALL INSTRUCTIONS CAREFULLY.

1. Understanding the question paper is also part of the exam, so do not ask for any clarification. Make suitable ASSUMPTIONS in case of any issues.
2. Final Submissions should be done on xeon as well as on Google classroom on your respective section folder on:
\\Xeon/Fall 2023/Usama Khan/CN Lab/Final Exam/Submissions/<Your section>
Each question related file must be in a separate folder (Question 1, Question 2) and all the separate folders must be in a single folder. The final folder must be renamed after your roll number and section e.g., "20L-4125_5A1". Multiple submissions are not allowed (if done, only the first one will be considered). In case of missing or corrupt file submission, all the responsibility will be on the student himself.
3. Your cell phones/smart watches MUST be turned off and placed far away from the PCs.
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 the 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 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 a cell phone/smart watch.
iv. You are caught accessing internet

Question 1: **TCP SOCKET PROGRAMMING** **(Marks: 30)**

****Submission: You have to submit your (Roll-No_Client.c) and (Roll-No_Server.c) files in a folder named Question 1, make sure to add screenshots if your code is working****

Create a simple multithreading program that reads data from an **input file**, performs a basic manipulation, and sends the modified data back to the client.

Input File Contents (Make it yourself *input.txt*):

Hello,

This is a sample input file for Computer Networks Final Exam.

Please manipulate this text.

Good luck!

a) Server Program: Implement a server that listens on a specific port: The server should use multithreading to handle multiple client requests simultaneously.

b) Client Program: Implement a client that connects to the server: The client should read the contents of *input.txt* and send it back to the server.

c) Server-Side Manipulation: The server should receive the text from the client, convert it to uppercase if its lowercase already or convert it to lower-case if it was upper-case already. Secondly, it should append - "Processed by Server"; to each line. Save the manipulated text to an output file named *output.txt*

d) Client-Side Output: Display the received and processed text from the server on the client-side console, from the *output.txt* file.

e) Multithreading: Ensure that the server can handle multiple client requests concurrently using multithreading.

f) Error Handling (BONUS MARKS): Implement error handling for socket operations and file manipulations.

Example Output (output.txt):

hELLO, - pROCESSED BY sERVER

tHIS IS A SAMPLE INPUT FILE FOR cOMPUTER ... fWORKS fINAL eXAM. - pROCESSED BY sERVER

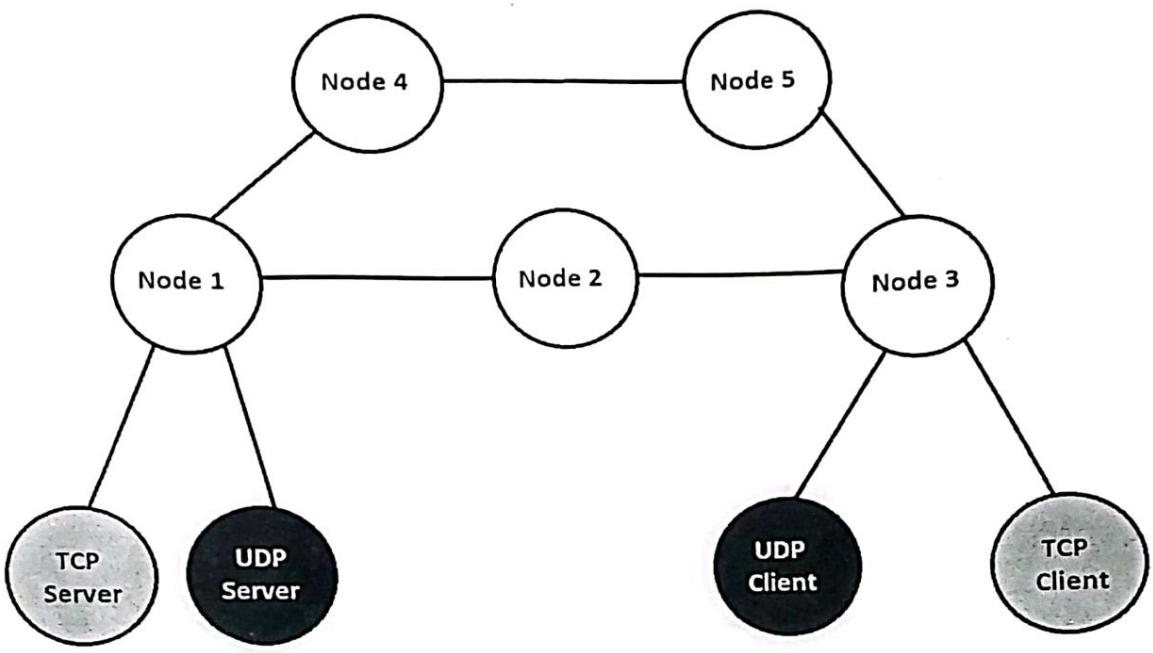
pLEASE MANIPULATE THIS TEXT. - pROCESSED BY sERVER

gOOD LUCK! - pROCESSED BY sERVER

A - 65
a - 97

Question 2: **CISCO Packet Tracer** (Marks: 10)

Use Cisco Packet Tracer to implement the figure below:



The Server and Clients are Generic PC and use router and/or switches as per your knowledge from your labs for Node 1 to Node 5. The PCs connected to Node 1 should be on class C (192.168.X.X). The PCs connected to Node 3 should be on class B (172.16.X.X). There is no restriction for subnet class for routers (if any), do proper subnetting for the entire network.

Properly label the diagram for full credit. Only use the devices that have been taught during the lab sessions i.e. Generic PCs, Switches, Router 2811/Generic etc.

172.16.0.0
172.16.0.1
172.16.0.2 **Best of Luck ☺**

10.0.0.1

10.0.0!