


# National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	Computer Networks Lab	Course Code:	CL-307
	Program:	BS(Computer Science)	Semester:	Fall 2020
	Duration:	2 hr 30 min	Total Marks:	50
	Paper Date:	24- February -2020	Weight	50
	Section:	ALL	Page(s):	4
	Exam Type:	Final		

Student : Name: \_\_\_\_\_ Roll No. \_\_\_\_\_ Section: \_\_\_\_\_

**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. Only write your name, roll number and section on the question paper.
2. Final Submissions should be done in your respective section folder on \\cactus\Xeon\Fall2020\COMPUTER NETWORKS LAB\Final Submission. 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., "18L-4125". Multiple submissions are not allowed (if done, only first one will be considered).
3. Submit the same code files on Google classroom.
4. 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.
5. 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

## NETWORK SIMULATOR 2

(Marks: 25)

**\*\*Submission: You have to submit your (Roll-No.tcl) file in a folder named Question 1. You should provide screen shots of your working code along with the tcl file \*\***

ABC Bank Ltd. faces several issues during the day when their system is down and they can not connect to their servers. In order to avoid this they have come up with a topology. Before they implement this they want you to simulate the their topology. So that they know which nodes could cause problems if any link is down. So they have also given you test cases as scheduling events. Their communication has both TCP and UDP Servers. They use **Distance Vector Routing protocol (1)**. You have to **assume all devices as nodes and all wires as duplex links (1)**. The link parameters are:

- Capacity of 512Kb
- Propagation Delay of 10ms
- Stochastic fair queue scheduling algorithm

(1)

PC1 and PC2 are TCP clients. PC3 and PC4 are UDP clients. The TCP data should be RED in color.

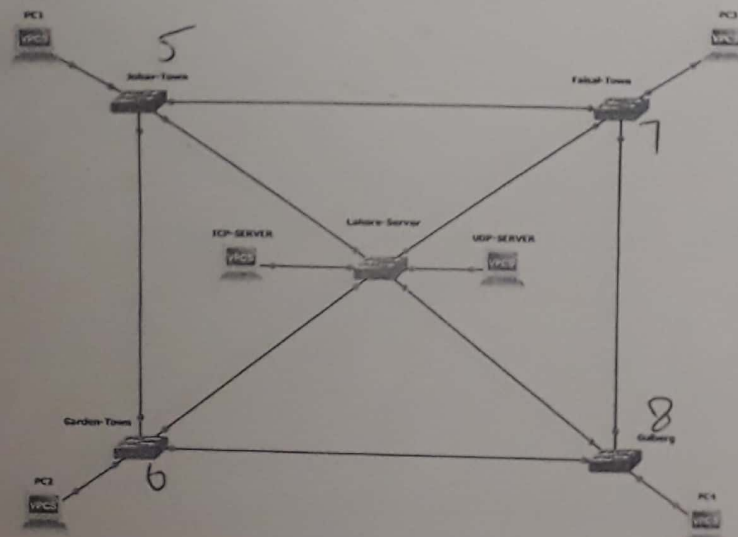
The UDP data rate is 256Kbps having BLUE color. (2)

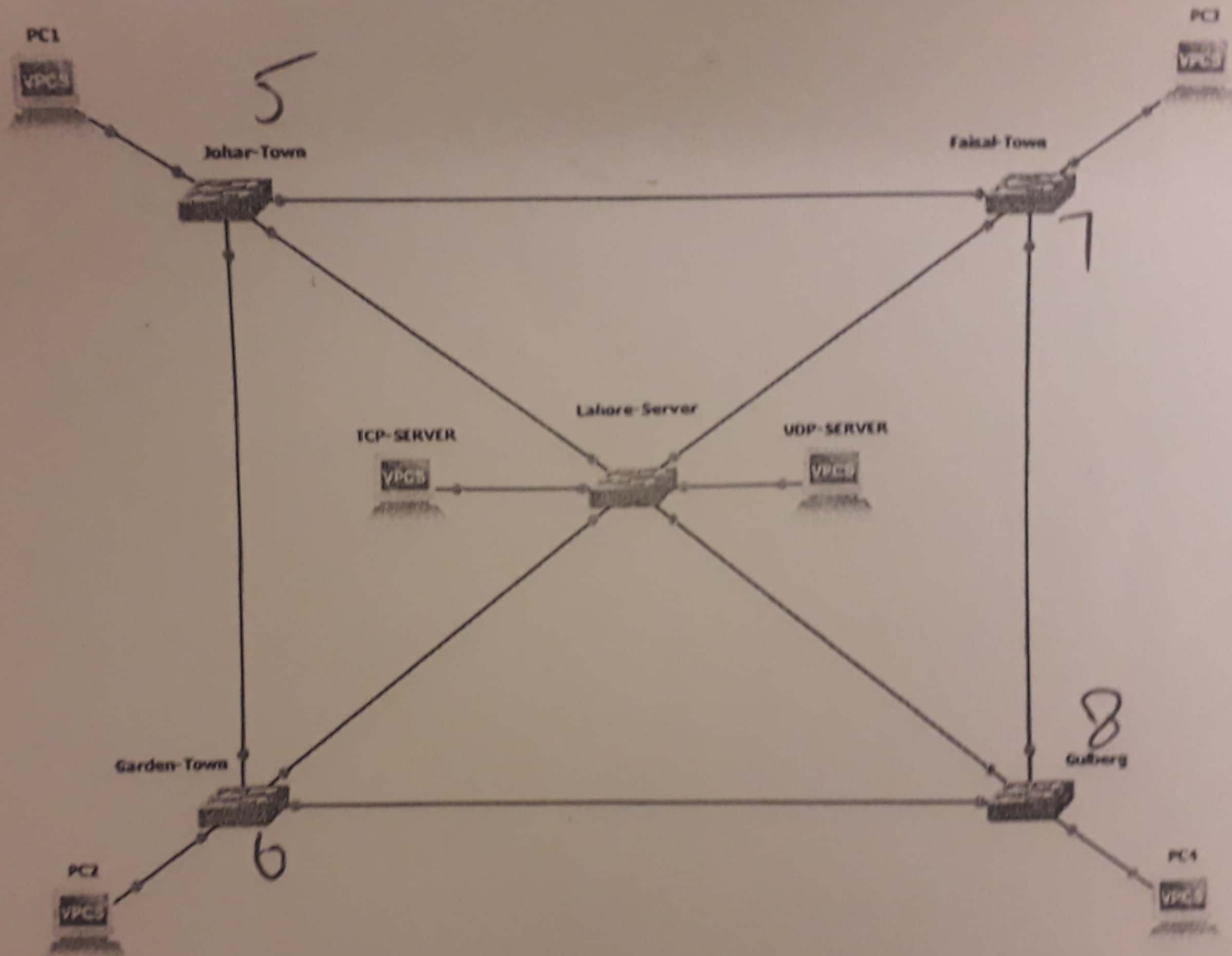
You must orient all nodes as shown in the topology below. (6)

#### Schedule of Events:

- TCP Data starts at 0.2s and stops at 2.8s
- UDP Data starts at 0.5s and stops at 2.6s
- Bring the link **DOWN** between Garden Town switch and Lahore Server Switch at 1s and **UP** at 2s.
- Bring the link **DOWN** between Johar Town switch and Lahore Server Switch at 1.3s and **UP** at 2.3s.
- Bring the link **DOWN** between Faisal Town switch and Lahore Server Switch at 1.5s and **UP** at 2.4s.
- Bring the link **DOWN** between Gulberg switch and Lahore Server Switch at 1.7s and **UP** at 2.6s.
- Stop the simulation at 3.0s

(14)







## Part 2

## CISCO PACKET TRACER

(Marks: 25)

Considering your proficient skills in computer networking, FAST's management has assigned you a task to configure a network between three franchises of a well reputed private company located in Lahore. Network configuration will be in such a way that all devices in each franchise must be able to communicate with each other as well as with all the devices of any other franchise.

Following information has been provided to you for the formation of network.

- Franchise-A has total of 5 customers in a shop at a time (due to covid-19 restriction) and for the sake of simplicity consider that each customer has only 2 internet devices (choose PCs as internet devices) with them.
- Franchise-B has total of 3 customers and each customer possess 3 internet devices with them.
- Franchise-C has total of 2 customers and each customer possess 4 internet devices with them.

Each franchise has been assigned a different IP network address which are as follows.

- **Franchise-A:** 132.155.96.0/18 (3)
- **Franchise-B:** 99.152.0.0/16 (3)
- **Franchise-C:** 119.64.172.64/25 (3)

Moreover, for serial communication between the routers, FAST's management has bought following prefix

- **Serial Communication:** 172.150.112.160/27 (3)

Your task is to design network in such a way that all devices of the same customer must be on a same sub-network and all the customers in franchises must be on a different sub-network. (5)

Make sure to use the relevant franchise's network address while making the subnets. Following conditions must be met while simulating the topology:

1. Use Straight Through wires, Cross Over cables or Serial DCE wires where necessary and applicable
2. Use **Generic Router** and **Generic PCs** for your design
3. You have to assign IPs to the devices using **Static IP allocation** (3)
4. Although you have to use GUI of the router to configure its interfaces but you must use CLI of the router to configure the **RIPv2 protocol** for **Classless Subnet addressing** and attach screen shots of the CLI code (You can use snipping tool to take screen shots or you can attach a text file having the CLI code of each router). (5)

Clearly mention each subnet address using **COMMENTS** and make your design as neat as possible to get the full credit.

## NS2 SYNTAX:

**Routing Algorithm:** \$ns rtproto <protocol\_name>; <protocol\_name>: DV

**Node creation:** set <node\_name> [\$ns node]

set n(\$i) [\$ns node] (when for loop is used)

**Links Creation:** \$ns <link\_type> <node1> <node2> <Bandwidth> <Delay> <queue\_type>

<link\_type>: simplex-link, duplex-link

<queue\_type>: DropTail, SFQ

**Graphical Settings (NAM):** \$ns <type> <node1> <node2> <option> <args>

<type> : simplex-link-op, duplex-link-op;

<option> : orient, queuePos

**Transport Layer:** set <layer\_name> [new Agent/<agent\_type>]

<agent\_type>: UDP, TCP, Null, TCPSink

**Attaching Transport layer:** \$ns attach-agent <node\_name> <layer\_name>

**Connecting Transport layer:** \$ns connect <layer\_name> <layer\_name>

**File Transfer Protocol:** set <ftp\_name> [new Application/FTP]

**FTP Attach Agent:** <ftp\_name> attach-agent <layer\_name>

**Constant Bit Rate:** set <cbr\_name> [new Application/Traffic/CBR]

**CBR Attach Agent:** <cbr\_name> attach-agent <layer\_name>

**CBR Parameters:** <cbr\_name> set <parameter> <parameter\_value>

<parameter>: packetSize\_, interval\_, rate\_

**Event Scheduling:** \$ns at <time\_frame\_value> "<cbr\_name>/<ftp\_name> <time\_event>"

<time\_event>: start, stop

**Link Up/Down:** \$ns rtmodel-at <time\_frame\_value> <function> <node1> <node2>

<function>: up, down