**COMSATS UNIVERSITY ISLAMABAD**

**Lahore Campus**

**Department of Computer Science**

**□ Mid-Term Examination ■ Terminal Examination Fall 2023**

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| Course Title: | Computer Networks | | | | Course Code: | | CSC340 | Credit Hours: | 4(3,1) |
| Course Instructor/s: | Hina Saleem | | | | Programme Name: | | BS SE | | |
| Semester: | 4th | Batch: | FA22 | Section: | A | | Date: | 31-05-2024 | |
| **Time Allowed:** | **180 Minutes** | | | | **Maximum Marks:** | | | **50** | |
| Student’s Name: |  | | | | Reg. No. |  | | | |

**QUESTION 1. [CLO:6; Bloom Taxonomy Level <Applying>] [10+20 = 30 Marks]**

**Part A:**

Create the topology consisting of routers, and other components that’s needed to apply the following concept on routers and switches. And attach CLI commands and output representing proper configuration.

1. Apply VLAN and inter-VLAN **[5 marks]**
2. Apply dynamic NAT **[5 marks]**

**Part B:**

Consider the Trace file given and answer the following questions:

**A:** Find the First **[syn]** on port 80, according to that First syn fill out the table below: **(6 Marks)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Three way Handshake** | **Packet Number** | **Source Port** | **Destination Port** | **Flags On** | **Sequence number (relative)** | **Acknowledgment number (relative)** |
| **First Handshake** |  |  |  |  |  |  |
| **Second Handshake** |  |  |  |  |  |  |
| **Third Handshake** |  |  |  |  |  |  |

**B:** Consider the Acknowledgment number **35749** in packet **169** as the first segment. Now look for the next 5 segments that receive the acknowledgment upto **62029** ack and calculate the difference between them also calculate the estimated RTT for each of the **6 ack packets**? **(6 Marks)**

**C:** Are there any retransmitted segments on **Port 63344** in the trace file? What did you check for (in the trace) in order to answer this question? **(1 Marks)**

**D:** What is the **throughput** (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value? **(3 Marks)**

**F:** What is the minimum amount of available buffer space advertised at the received for the entire trace?

**(1 Marks)**

**G:** What is the length of each of the last six TCP segments that was sent from the client side? **(3 Marks)**

**QUESTION 2: [CLO: 5; Bloom Taxonomy Level <Creating>] [20 Marks]**

Build a simple **client-server multi-threaded system**. The protocol between the client and server is as follows.

* The server is first started on a known port.
* The client program is started (server IP and port is provided on the command line).
* The client connects to the server, and then asks the user for **input integer (a Celsius Temperature**). The user enters the input integer. The user's input is sent to the server via the connected socket.
* The server reads the user's input from the client socket, evaluate the **temperature in Fahrenheit**, and sends the result back to the client.
* The client should display the server's reply to the user, and prompt the user for the next input, until the user terminates the client program with exit.