Report for LAB 3-2: TCP

Name:	Student ID:	Date:

Part I

1	Socket addresses: **Client:** IP 192.168.1.138, Port 59992 **Server:** IP 142.250.192.132, Port 443
2	Set flags: **Frame 65:** SYN, ACK **Frame 66:** ACK
3	Sequence number and acknowledgement number: **Frame 65:** - Sequence number: 0 (server) - Acknowledgement number: 1 (server acknowledging client's SYN) **Frame 66:** - Sequence number: 1 (client) - Acknowledgement number: 1 (client acknowledging server's SYN-ACK)
4	Window size: Window size value: 502 (client)

Part II

1	Set flag in HTTP GET message: Based on Frame 16222, the flags in the HTTP GET message are: **PSH (Push):** Indicates this is the last segment of the HTTP GET message. **ACK:** Acknowledges receiving data from the server.
2	Number of bytes transmitted by the HTTP GET message: The "TCP Segment Len" field in Frame 16222 shows 87 bytes. However, this only represents the size of this particular segment, not the entire message. The complete message size might be spread across multiple segments.
3	Acknowledgement frequency: TCP acknowledges received data segments, but the frequency isn't directly mentioned in the frame. It depends on various factors like window size, network conditions, and server configuration. Corresponding rule:
4	Number of bytes transmitted by each packet:

	Similar to point 2, the "TCP Segment Len" (87 bytes) only reflects the size of this specific segment. The actual number of bytes transmitted per packet depends on the network's MTU (Maximum Transmission Unit). Relation to sequence and acknowledgement Number:
5	Original window sizes: Frame 16222 shows a window size value of 502 bytes. However, the "Calculated window size" is 64256 bytes, indicating a scaling factor of 128 applied. It's likely the initial window size was smaller, and it increased based on previous acknowledgements from the receiver. Are these numbers expected? **Calculated window size of 64256 bytes:** This larger size is expected because it considers the **window scaling factor of 128**. This scaling allows for larger window sizes than the standard 2-byte field in the TCP header can represent. How window sizes change? TCP utilizes a dynamic window size mechanism to optimize data flow and prevent congestion. Here's an overview of how window sizes change: • **Initial Window Size:** This is set when the connection is established and depends on various factors. It is typically a small value to avoid overwhelming the receiver initially. • **Window Increase:** When the receiver acknowledges received data, the sender's window size increases. This allows the sender to send more data without overwhelming the receiver's buffer.
6	How the window size is used in flow control? **TCP utilizes window size to prevent overwhelming the receiver's buffer.** It acts as a credit system, allowing the sender to transmit data up to the advertised window size before needing an acknowledgement (ACK) from the receiver. • **Window size is dynamic and changes based on various factors:** • **Increases:** When the receiver acknowledges received data, the sender's window size increases, allowing it to send more data. • **Decreases:** This can happen due to congestion control mechanisms (e.g., fewer ACKs due to congestion) or receiver buffer limitations (receiver advertises a zero-window size when full).
7	Purpose of the HTTP OK message: The purpose of the HTTP OK (status code 200) message from the server is to indicate **a successful request**. It signifies that: • **The server understood the request:** The server successfully parsed and interpreted the HTTP request sent by the client (e.g., the browser). • **The resource was located:** The server was able to find the resource requested by the client (e.g., a specific web page, image, or file). • **The resource is being sent:** The server is actively sending the requested resource data

	back to the client.
	Therefore, the HTTP OK message acts as a confirmation and positive response to the client's request, informing them that their request was processed successfully and the desired information is being delivered.

Part III	
1	Number of TCP segments exchanged for connection termination:
1	Which end point started the connection termination phase?
2	Flags sets in each of the segments used for connection termination:

Part IV		
1	a. Source port number: 59992	b. Destination port number: 443
	c. Sequence number : 1	d. Acknowledgement number: 1
	e. Heather length: 32	f. Set flags: ACK
	g. Window size: 502	h. Urgent pointer:0
2	Are answer in the question number 1 verified by the information in the detail pane lane? Yes	
3	Does any of the TCP packet headers carry options? No potions Explain	
4	Size of a TCP packet with no option: 20 Bytes plus Data length Size of a TCP packet with options: 20 bytes + OPTION LENGTH + DATA LENGTH	
5	Is window size in any of the TCP packet zero? NO Explain:	