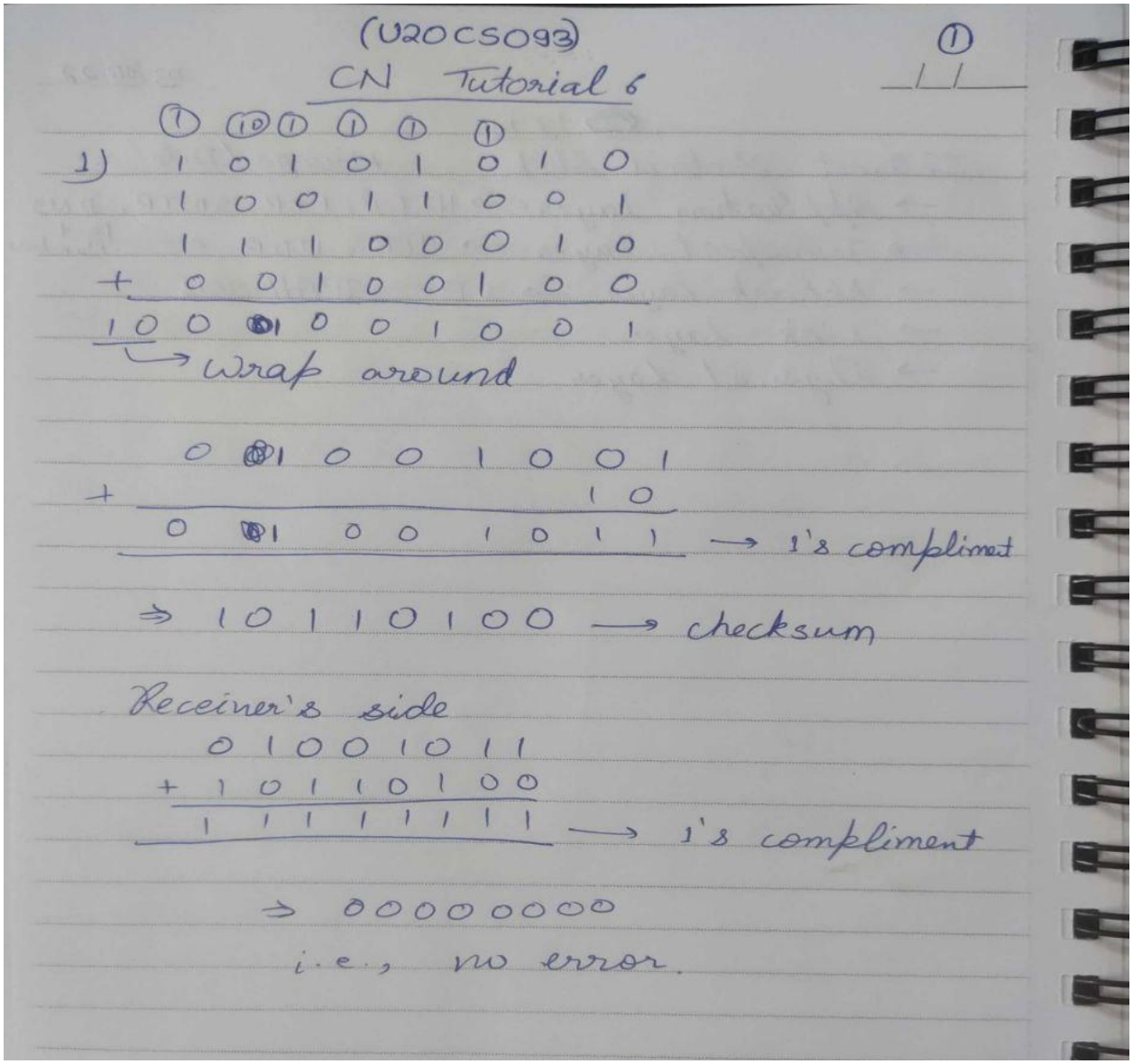
NEHAL JHAJHARIA (U20CS093)

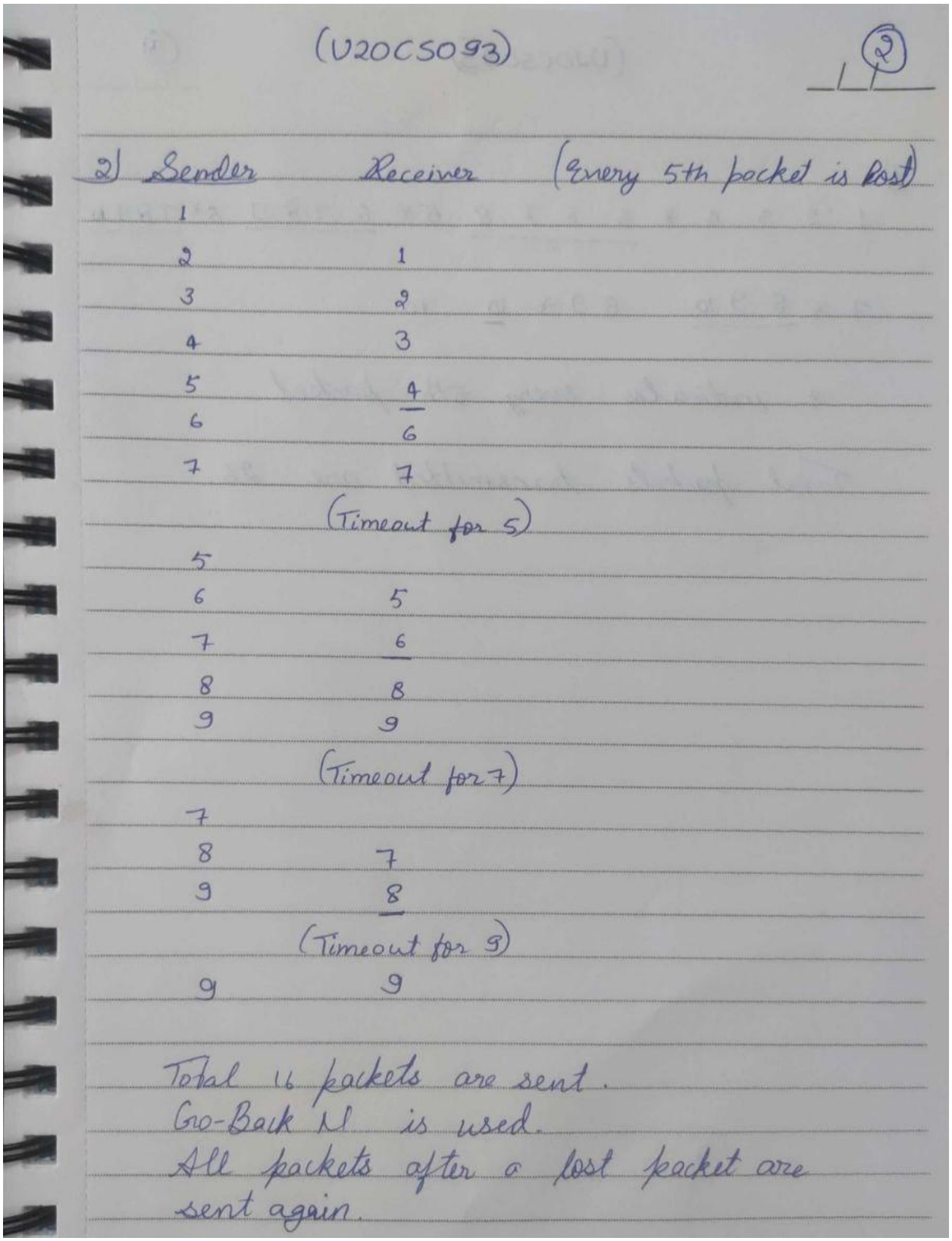
COMPUTER NETWORKS

TUTORIAL 07

1)



2)



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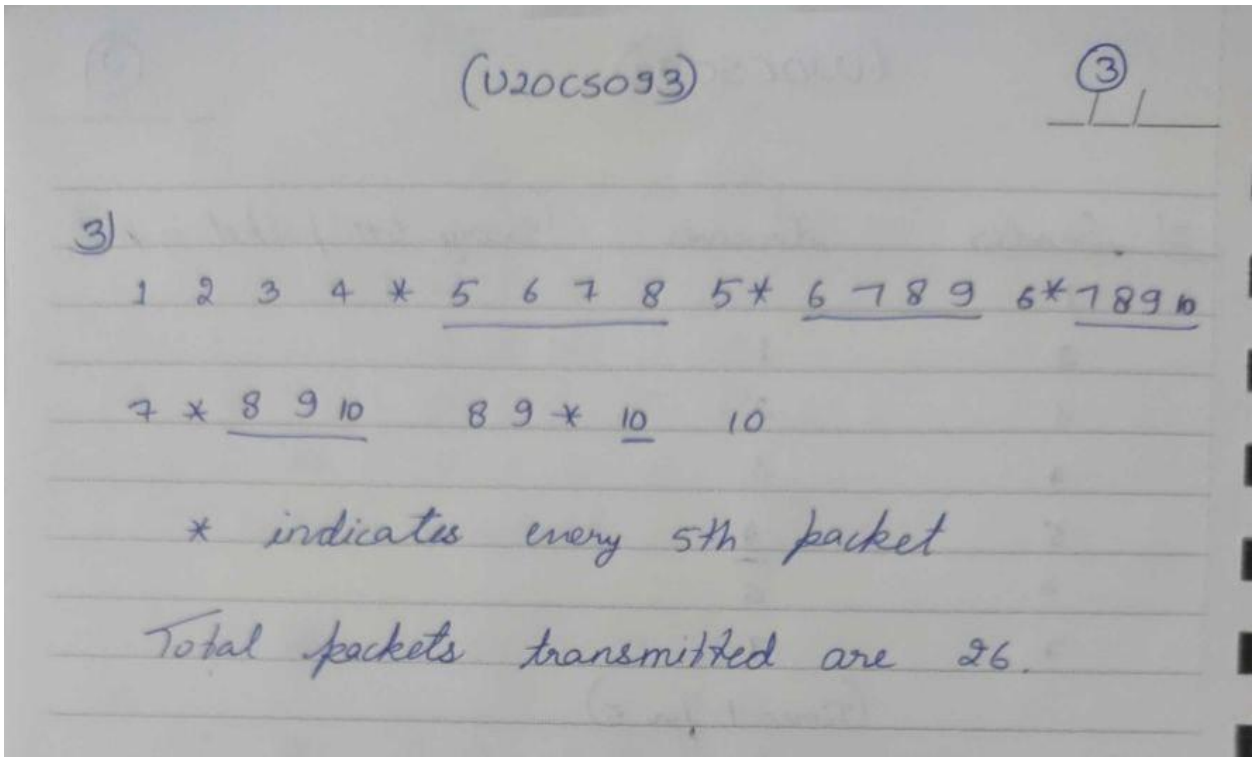
2) Sender Receiver (every 5th packet is lost)

Sender	Receiver
1	
2	1
3	2
4	3
5	4
6	6
7	7
(Timeout for 5)	
5	
6	5
7	6
8	8
9	9
(Timeout for 7)	
7	
8	7
9	8
(Timeout for 9)	
9	9

Total 16 packets are sent.
Go-Back N is used.
All packets after a lost packet are sent again.

3)



4)

➢ **Stop and Wait –**

The sender sends the packet and waits for the ACK (acknowledgement) of the packet. Once the ACK reaches the sender, it transmits the next packet in a row. If the ACK is not received, it re-transmits the previous packet again.

➢ **Go Back N –**

The sender sends N packets which are equal to the window size. Once the entire window is sent, the sender then waits for a cumulative ACK to send more packets. On the receiver end, it receives only in-order packets and discards out-of-order packets. As in case of packet loss, the entire window would be re-transmitted.

➢ **Selective Repeat –**

The sender sends packets of window size N and the receiver acknowledges all packets whether they were received in order or not. In this case, the receiver maintains a buffer to contain out-of-order packets and sorts them. The sender selectively re-transmits the lost packet and moves the window forward.

5)

Congestion Window (cwnd) is a TCP state variable that limits the amount of data the TCP can send into the network before receiving an ACK. The Receiver Window (rwnd) is a variable that advertises the amount of data that the destination side can receive. Together, the two variables are used to regulate data flow in TCP connections, minimize congestion, and improve network performance.

6)

S.NO	Flow Control	Congestion Control
1.	Traffic from sender to receiver is controlled, to avoid overwhelming the slow receiver.	Traffic entering the network from a sender is controlled by reducing the rate of packets. Here, the sender has to control/modulate his own rate to achieve optimal network utilization.

2.	Flow control is typically used in the data link layer.	Congestion control is applied in the network and transport layer.
3.	In this, the receiver's data is prevented from being overwhelmed.	In this, Network is prevented from congestion.
4.	In flow control, the sender needs to take measures to avoid the receiver from being overwhelmed depending on feedback from the receiver and also in absence of any feedback.	In this, many algorithms designed for transport layer/network layer define how endpoints should behave to avoid congestion.

7)

- ➢ Data transfer by TCP is reliable than UDP.
- ➢ Most firewalls are configured to block UDP traffic.
- ➢ Connections that use voice/video are quite fast and therefore, would prefer TCP as delays due to packet loss would be fewer.
- ➢ Furthermore, personalised voice/video communication has grown with mass population today, leading to the need of lossless data.

8)

We use TCP/IP to talk about the suite of protocols that use TCP & IP. We don't use it to talk about TCP. Often, people mean "TCP/IP" to include other protocols like DNS, ARP, UDP, etc. So, we prefer TCP/IP & UDP/IP over TCP & UDP alone.