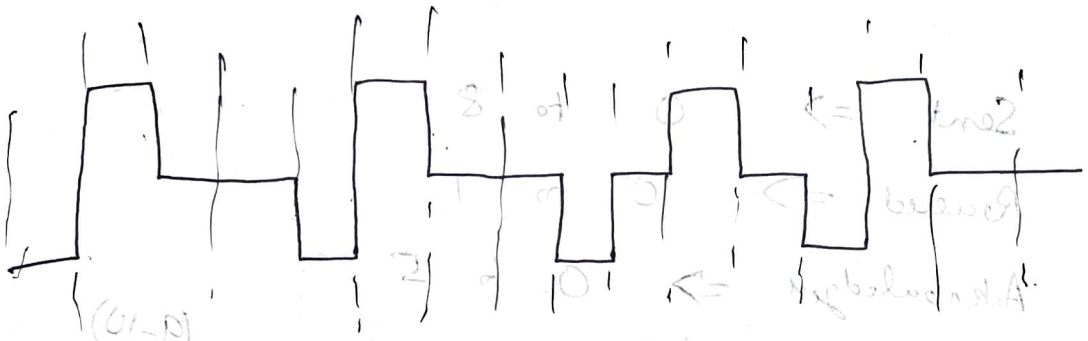
19CS30048 SUHAS JAIN

(Q1)

(a)

0 0 1 1 0 0 1 1 0 1 0 1 0 0 1 1



Total transitions = 12

(b)

```
  0 1 1 1
+ 1 1 1 1
---------
1 0 1 1 0

  0 1 1 0
+ 0 0 0 1   (carry)
---------
  0 1 1 1

  0 1 1 1
+ 1 0 1 0
---------
1 0 0 0 1

  0 0 0 1
+ 0 0 0 1   (carry)
---------
  0 0 1 0
```

Sum = 0010

1's complement = 1101

Final bit stream = 0111 1111 1010 1101

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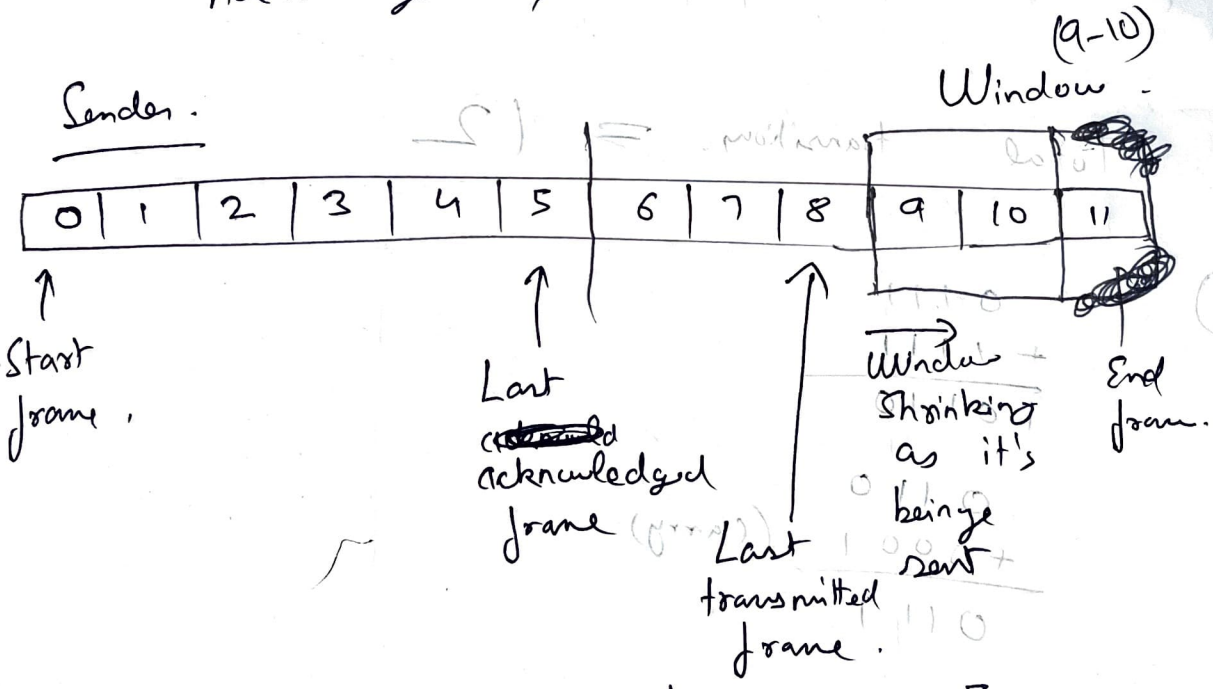
(c) Sent => 0 to 8

Recieved => 0 to 7

Acknowledged => 0 to 5




⇒ Window-size is at max 5 so all the remaining frames (9-10) are in the window.

3 are still unacknowledged.

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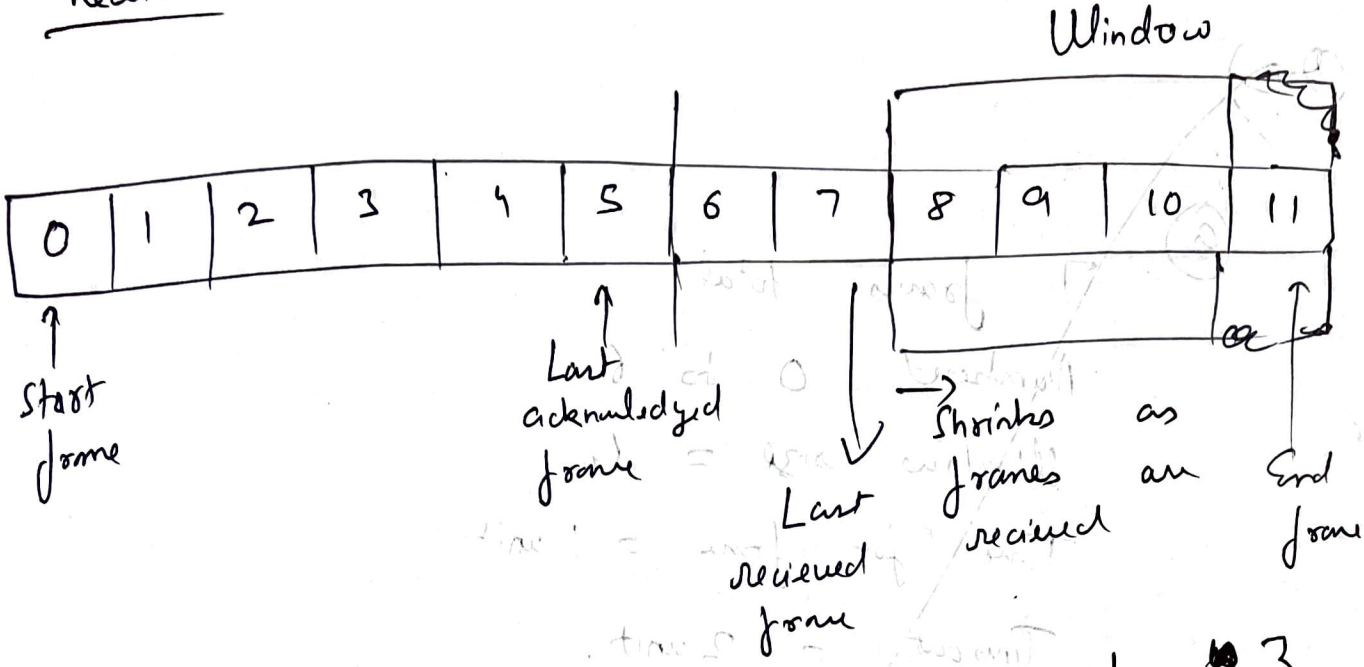
5-3 = 2 → 9 and 10

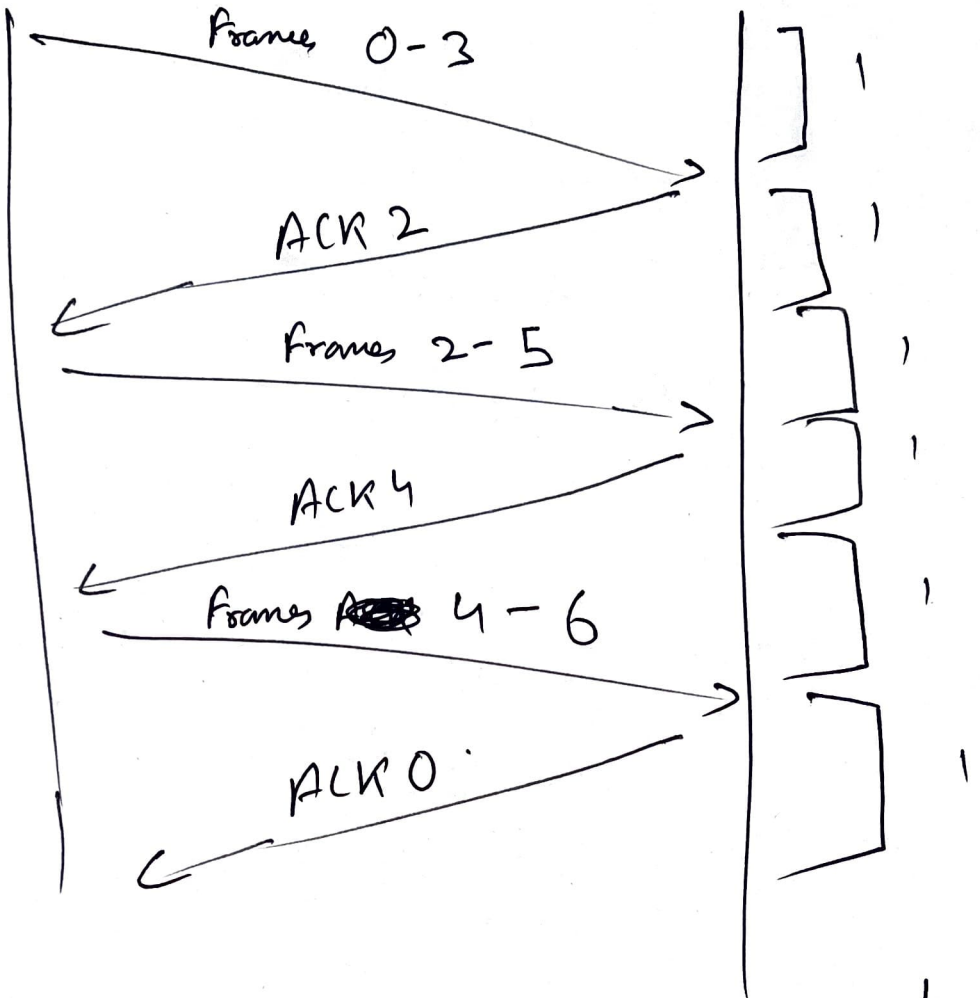
Receiver.




⇒ Max window size is 5 and 3 frames are remaining so 8-10 will be in the window. 2 are not ack. Receiver already knows total number of frames. 5-2 = 3 frames in window (8-10)

Q2)

(a)




(b) Selective repeat ARQ is used.

- In low loss scenarios
- Go back N will have to send everything again which is inefficient
- Hence selective repeat ARQ is better.

93 (a)

$T \rightarrow R$

100 Mbps.

$V = 2 \times 10^8$ m/s

dist = 500 m.

Propagation delay $= \frac{500}{2 \times 10^8} \times 10^6$ µs

$= 2.5$ µs.

$L = \frac{2DR}{V}$

$= \frac{2 \times 500 \times 100 \times 10^6}{2 \times 10^8}$

$= 500$ bits.

Transmission Time $= \frac{500}{100 \times 10^6} \times 10^6 = 5$ µs.

7 µs have passed and it is transmitting, hence

actual packet length > min packet length.

Else T would have transmitted in 5 µs itself.

Yes, T may be able to transmit and even if a collision happens, it will be detected. and then T will be able to resend after the collision.

Q4)

(a) Total data = 5000 bytes.


Link = 100 Kbps.

Packet size = 500 byte

Header = 20 byte

Time for packet to hop = 100 ms

No. of packets = $\frac{5000}{500} = 10$

100 ms = Transmission delay + Propagation delay.

For all packets

A to $R_1$

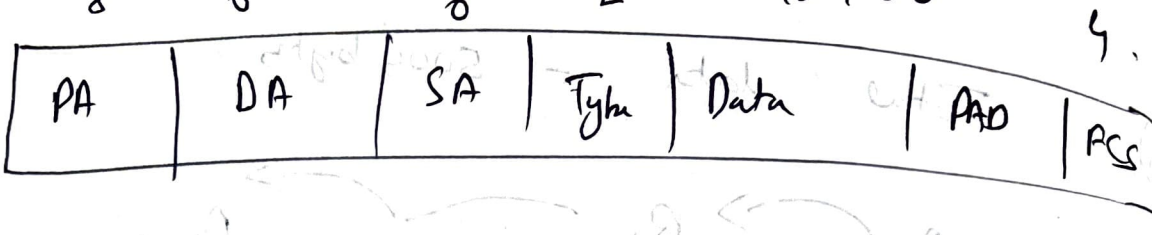
time = 10 × 100 ms = 1 sec

$R_1$ to B also

time = 1 sec

Total = 2 sec

(b)




Preamble first set synchronises the clocks of the receiver & also marks start of frame.

Destination address is matched, if not then discarded. Else proceed.

FCS checked for data integrity.

Ethernet specific header are stripped off and the packet is passed to network layer.

Q3

(b)


A sends RTS to B

B sends CTS

However due to collision with some packet. Possible CTS that A might reach A but does not reach C. So A sends the data to B. C will also send the data. so as it did not get CTS. Hence collision will happen at B.