CLO 1:

Q1: Answer the following multiple-choice questions by filling the following table:.....

Any answers outside the table will NOT be marked. Moreover, cutting and overwritin allowed.

1.1)	A ✓
1.2)	C ✓
1.3)	A ✓
1.4)	C ✓
1.5)	D ✓

1.1. The major differences between Go-Back-N (GBN) & Selective Repeat (SR) protocols
A. GBN uses cumulative ACK & single timer, while SR uses individual ACKS & indivi for each packet.
B. SR uses cumulative ACK & single timer, while GBN uses individual ACKS & indivi for each packet.
C. They are same
D. None of the above

1.2. Difference between flow control & congestion control is
A. They are the same
B. Flow control: Network is not overwhelmed; Congestion control: Receiver is not over
C. Flow control: Receiver is not overwhelmed; Congestion control: Network is not over
D. None of the above

1.3. Which of the following is **not** the characteristic of the Internet Protocol (IP)
A. Congestion Control
B. Best Effort Service
C. Stateless
D. Connectionless

1.4. The maximum size of an IP(v4) header is
A. 20 Bytes
B. 40 Bytes
C. 60 Bytes
D. 64K Bytes

1.5. The three architectural principles of the (pre-2005) Internet (RFC 1958) are:
A. SDN : Middle Boxes : NFV
B. White Boxes : Middle Boxes : NFV
C. Complex Architecture : Thin Waist : Intelligence at the network core
D. Simple Connectivity : Thin Waist : Intelligence at the network edge

CLO 2:

Q2: Consider a TCP connection between a sender and a receiver. The sender's initial congestion window size (cwnd) is set to 4 MSS (Maximum Segment Size), and is in slow start phase and the congestion threshold (ssthresh) is set to 16 MSS. After reaching the threshold it enters the congestion avoidance phase. The round-trip time is measured to be 150 ms. However, during the 2nd RTT of congestion avoidance, a packet loss occurs, and the sender enters the slow start phase. and new threshold is calculated. Please answer the following questions: **[2 x 5 = 10 Marks]**

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(i) **Time Taken to reach initial threshold:**

intial cwnd = 4, at threshold = Cwnd = 16

16 - 4 = 12, $\frac{12}{4MSS} = 3$

So 3RTT.

3(150) ms = 450 ms Ans ✓

(ii) **Time Spent in Congestion Control:**

2 RTT = 2(150) = 300 ms. ✓

(iii) **New Threshold:**

At 2nd RTT of congestion avoidance cwnd is 18

So,

New ssthresh = $\frac{18}{2}$ => 9 Mss ✓

(iv) **Time Taken to reach new threshold:**

Total 5 RTTs = 5(150) => 750 ms ✓

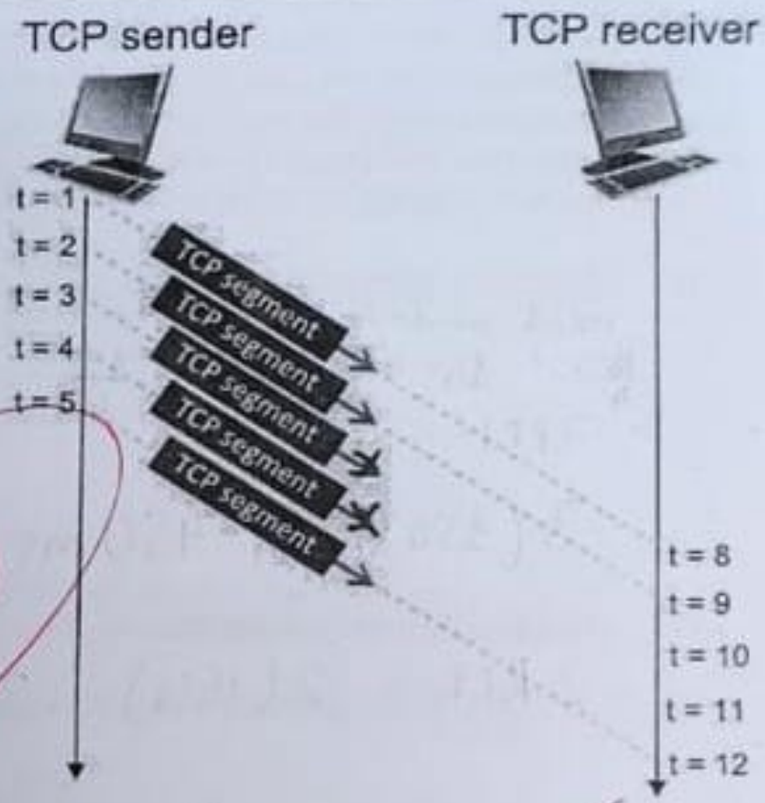
(v) **Total Time Consumed:**

= 450 ms + 300 ms + 750 ms ✓

= 1500 ms.

CLO 2:

Q3: Consider the figure below in which a TCP sender and receiver communicate over a connection in which the sender->receiver segments may be lost. The TCP sender sends an initial window of 5 segments. Suppose the initial value of the sender->receiver sequence number is 151 and the first 5 segments each contain 760 bytes. The first segment arrives at the receiver at t=8. As shown in the figure, 2 of the 5 segment(s) are lost between the segment and receiver. Answer the following: **[5 + 2 + 3 = 10 Marks]**



10

a) **Give the sequence numbers associated with each of the 5 segments sent by the sender.**

1st seq = 151, 2nd seq = 911, 3rd seq = 1671
4th seq = 2431, 5th seq = 3191

b) **Assuming an interval of more than 500 ms at the receiver between each segment received, how many total acknowledgements (ACKs) will the receiver generate in this scenario?**

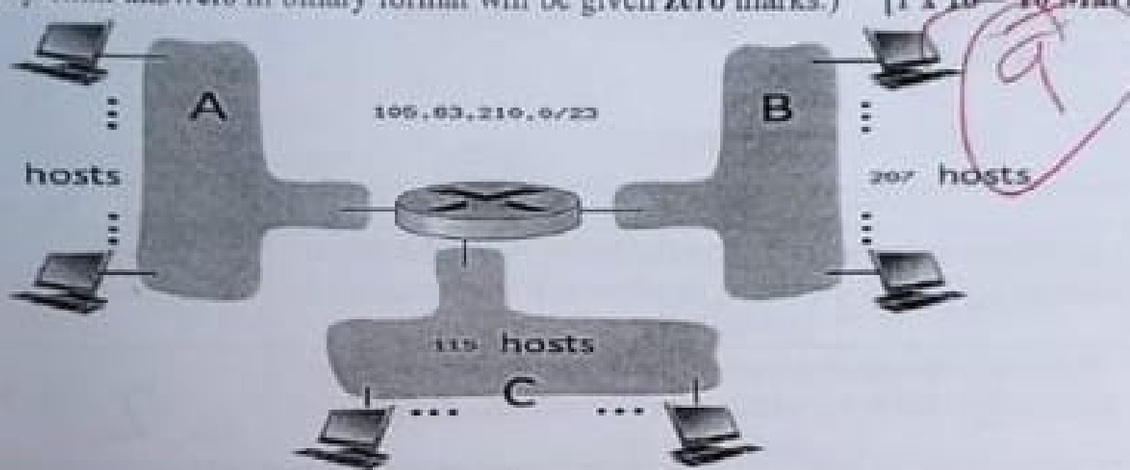
It will generate total 3 acks

c) **Give the ACK numbers of all the ACKs generated in part b)**

Ack1 = 911, Ack2 = 1671, Ack3 = 1671

CLO 3:

Q4: Refer to the figure below, three subnets need to be assigned to subnets A, B & C from the available parent IP address block 105.83.210.0/23 in a manner so that assigned IP addresses are minimal, leaving the largest amount of contiguous space available for future subnets. Please answer the following questions: (**Important Note**: All final answers should be in dotted decimal format CIDR notation. Any final answers in binary format will be given **zero** marks.) [1 x 10 = 10 Marks]



(i) Maximum number of hosts in the parent IP address block:

$2^9 = 512$ hosts $-2 = 510$

(ii) Subnet Address of Subnet A (in CIDR notation):

105.83.211.128/27

(iii) First assignable IP in Subnet A (in CIDR notation):

105.83.211.129/27

(iv) Broadcast address of Subnet A (in CIDR notation):

105.83.211.159/27

(v) Subnet Address of Subnet B (in CIDR notation):

105.83.210.0/24

(vi) First assignable IP in Subnet B (in CIDR notation):

105.83.210.1/24

(vii) Last assignable address of Subnet B (in CIDR notation):

105.83.210.254/24

(viii) Subnet Address of Subnet C (in CIDR notation):

105.83.211.0/25

(ix) Last assignable IP in Subnet C (in CIDR notation):

105.83.211.126/25

(x) Broadcast address of Subnet C (in CIDR notation):

105.83.211.127/25

CLO 3:

Q5: Answer both parts (a) & (b) [6 + 4 = 10 Marks]

(a) Consider a datagram network using 8-bit host addresses. The forwarding table for a router using longest prefix match is given towards the right side. Please answer the following: [2 + 2 + 2 = 6 Marks]

Prefix	Link Interface
01	1
11	2
011	3
110	4
000	5
default	6

	Question	Answer
i)	Suppose a datagram arrives at the router, with destination address 11110100. To which interface will this datagram be forwarded to?	2 ✓
ii)	Suppose a datagram arrives at the router, with destination address 11111010. To which interface will this datagram be forwarded to?	2 ✓
iii)	Suppose a datagram arrives at the router, with destination address 00100110. To which interface will this datagram be forwarded to?	1 ✗

(b) Summarize the four phases (steps) of DHCP [4]

I. client request for IP address to server. (request Ack)

II. Server check for available IP address (

III. Server sent ack if IP is available (sent Ack)

IV. Client gets an IP address.