# CS & IT ENGINEERING

## COMPUTER NETWORKS

## TCP & UDP

**Lecture No-4**

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**Phases of TCP connection**

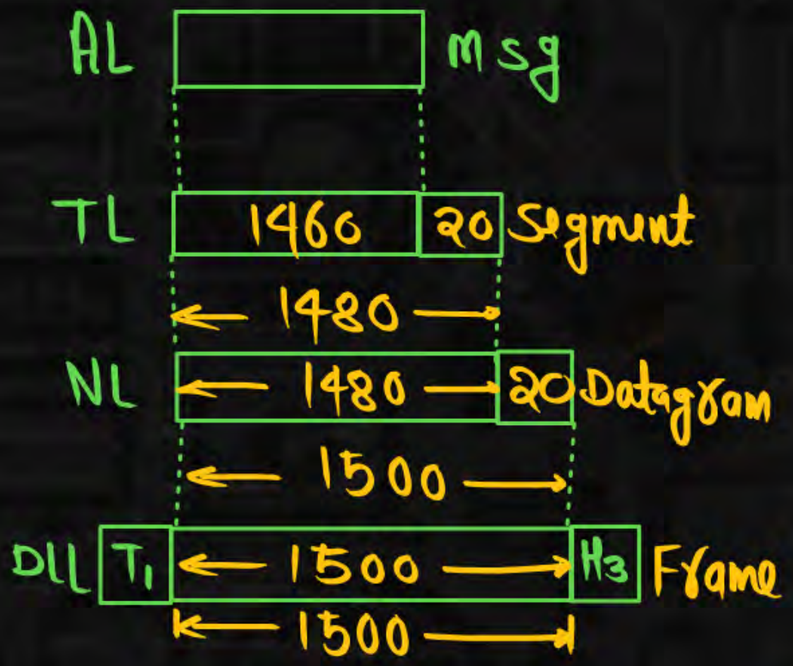
| 16 bits | | | | | | | | 16 bits |
|---|---|---|---|---|---|---|---|---|
| Source Port | | | | | | | | Destination Port |
| Sequence number | | | | | | | | |
| Acknowledgement number | | | | | | | | |
| HL (4 bit) | Reserved (6 bits) | URG | ACK | PSH | RST | SYN | FIN | Window Size or (Advertisement Window) |
| Check Sum | | | | | | | | Urgent Pointer |
| MSS =1460 | Options (0-40 bytes) | | | | | | | |

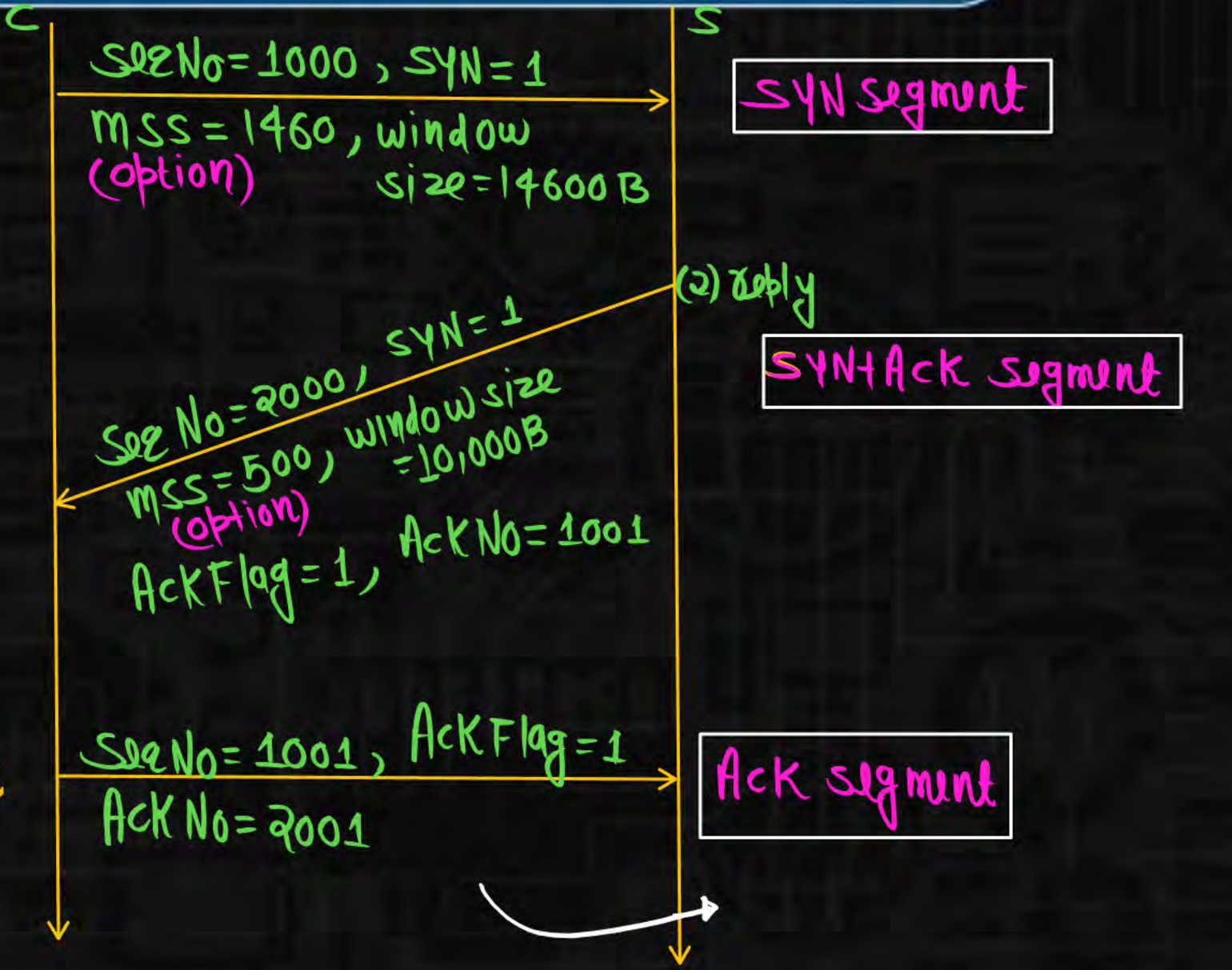
# Phases of TCP Connection

1. Connection establishment
2. Data transfer
3. Connection termination

SYN and Ack Flags are used in the connection establishment phase

# Connection Establishment Phase



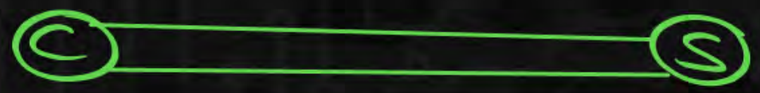
SYN = 1 → Consume one Sequence Number

FIN = 1 → Consume one Sequence Number

Ack = 1 → Consume No Sequence Number

1 Data Byte → Consume one Sequence Number

| SYN | Ack | |
|---|---|---|
| 1 | 0 | → Request |
| 1 | 1 | → Reply |
| 0 | 1 | → Ack \| Piggybacking |
| 0 | 0 | → Data |




Window size = 14600 B

No. of segments = $\frac{14600\,B}{1460\,B}$

No. of segments = 10

Window size = 10,000

No. of segments = $\frac{10,000\,B}{500\,B}$

No. of segments = 20

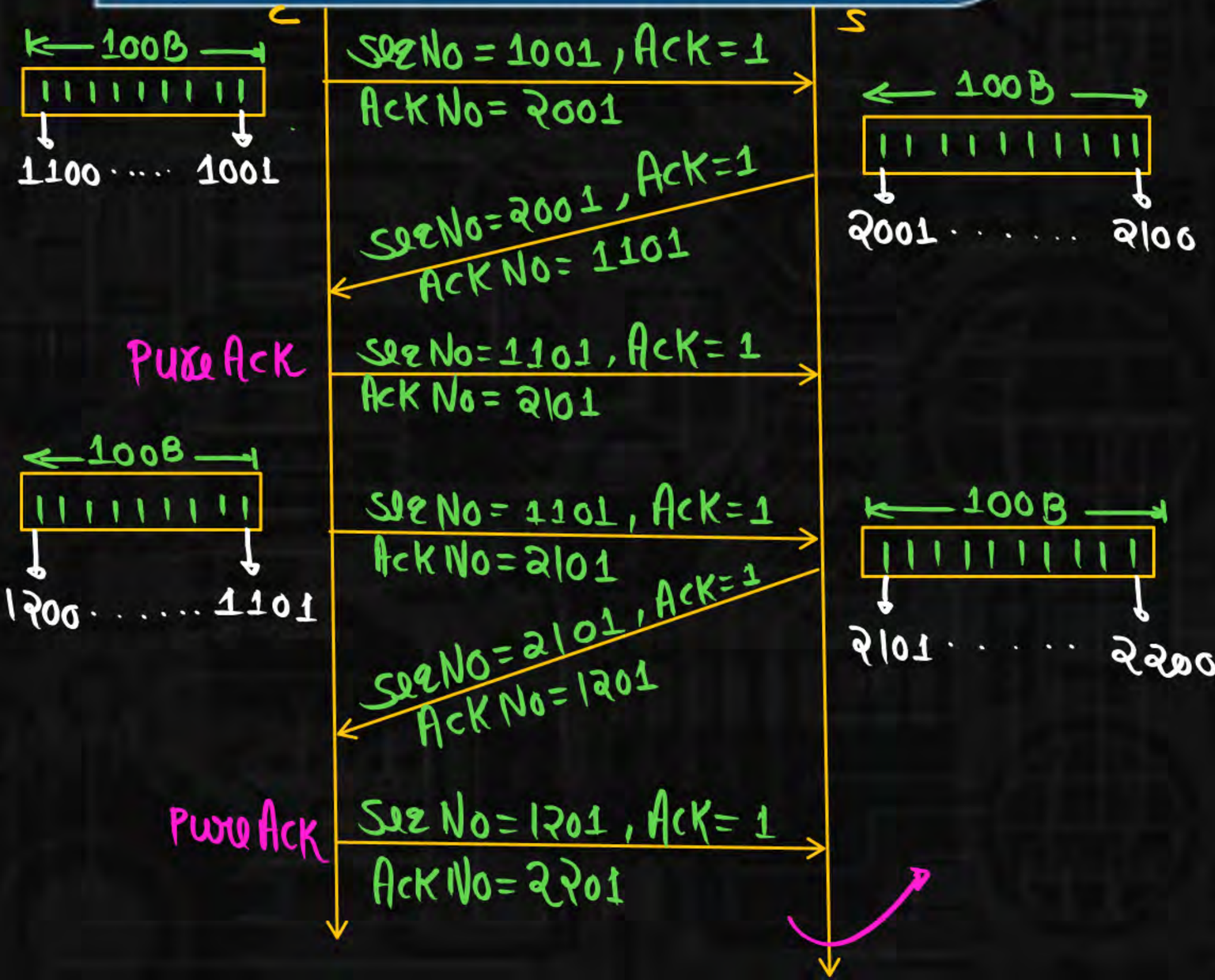
## Note:-

(1) A SYN segment cannot carry data, but it consume one sequence number.

(2) A SYN + ACK segment cannot carry data, but it consume one sequence number.

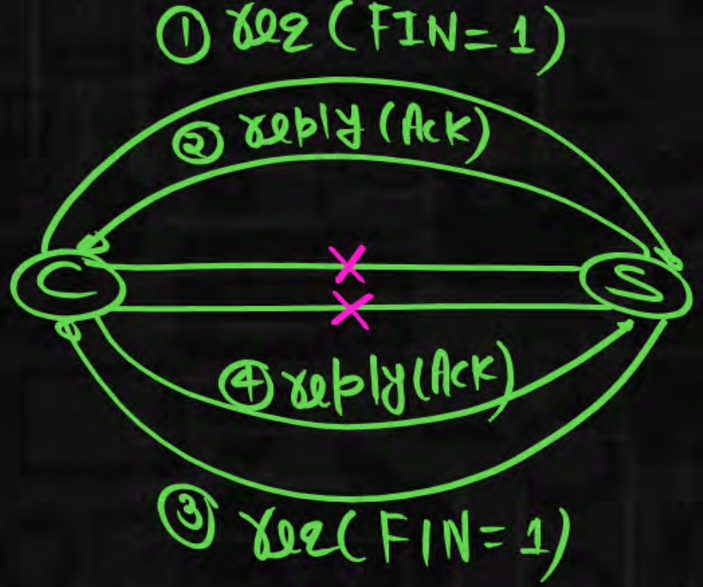
(3) An ACK segment, If carry no data then it will not consume sequence number.

# Data Transfer Phase



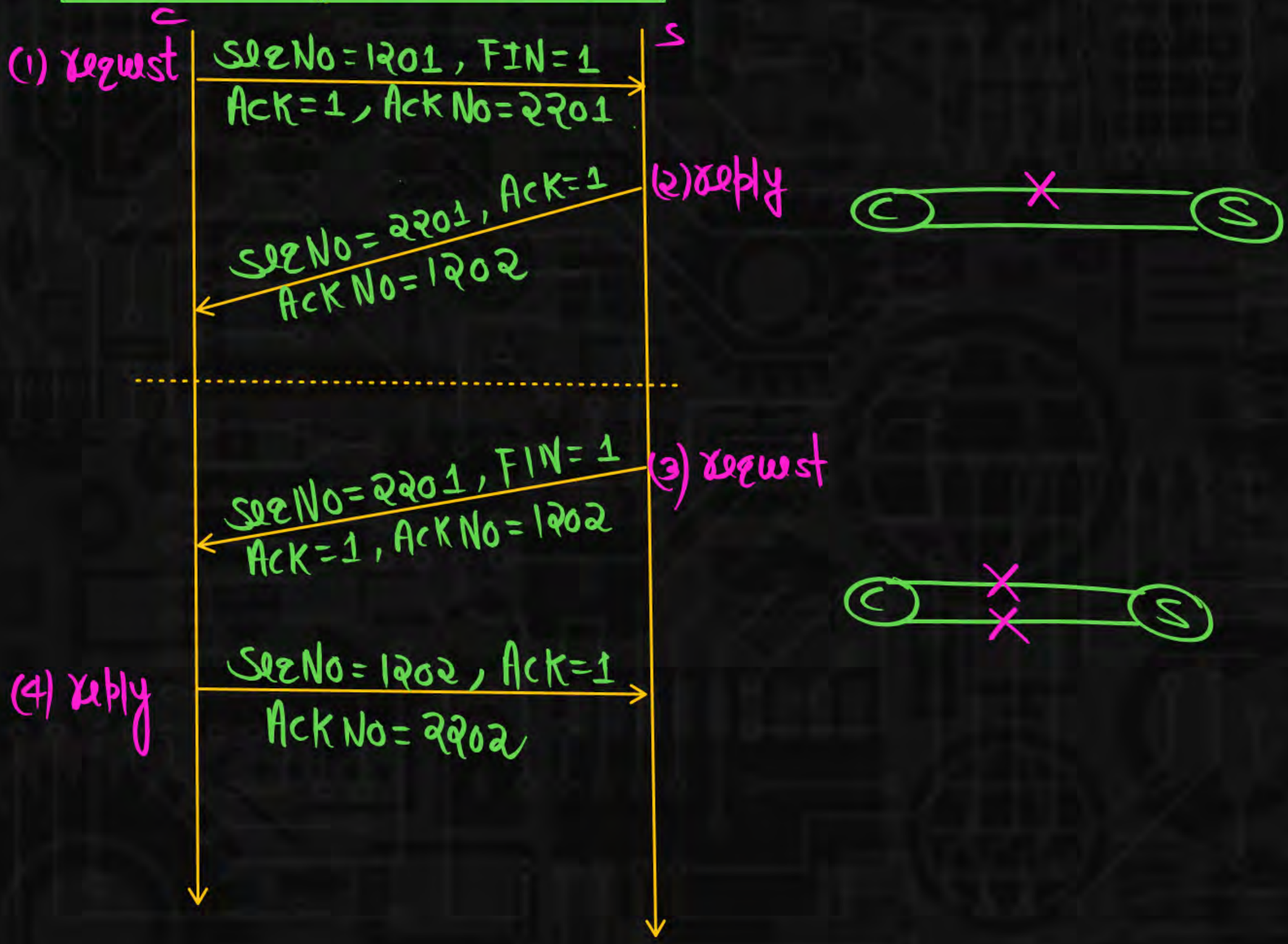
# Connection Termination Phase

- FIN Flag is used in the connection termination Phase




Connection termination is a 4 way Handshaking

# Connection termination



## Note:-

FIN segment cannot carry data but it consume one sequence number.

Q.1

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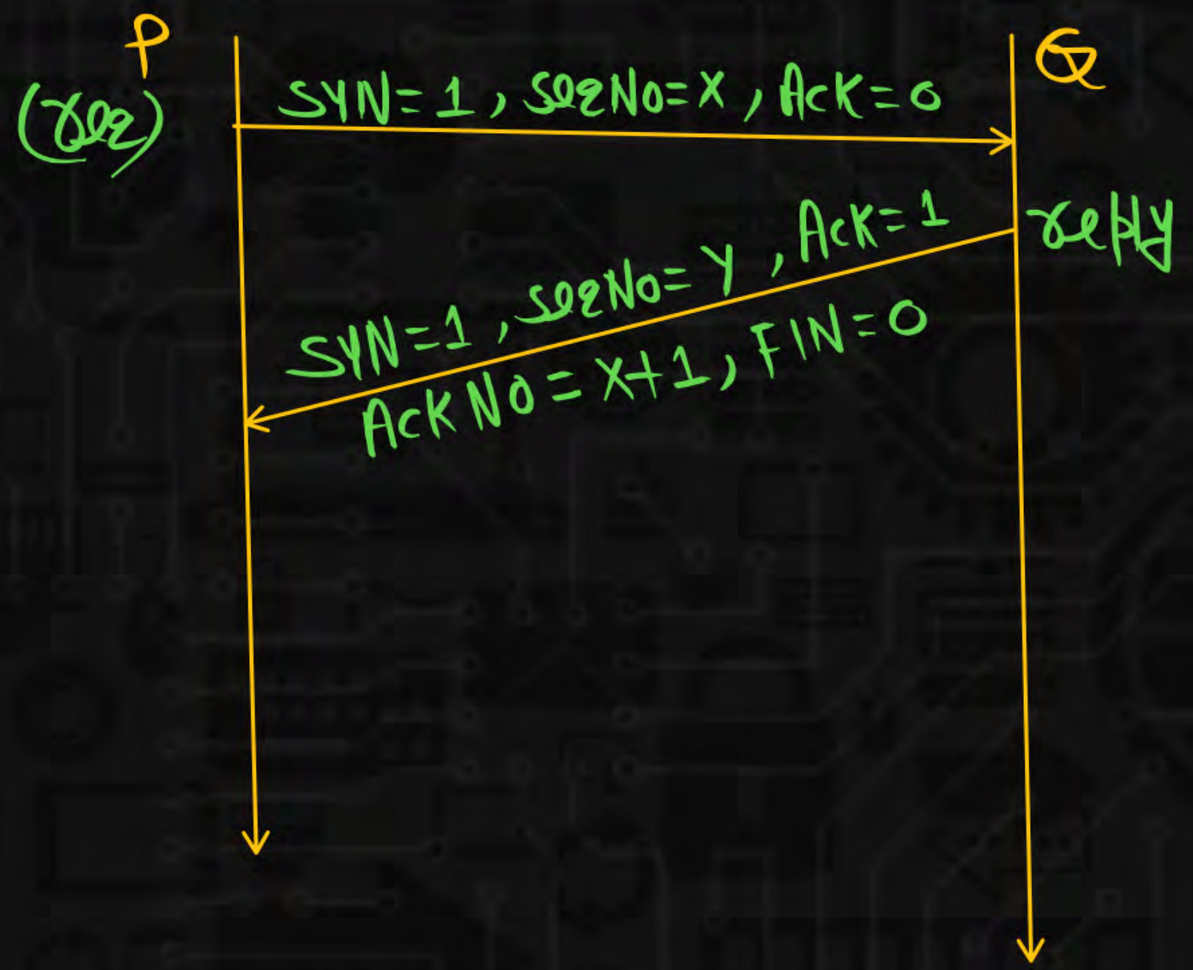
Consider the three-way handshake mechanism followed during TCP connection establishment between hosts P and Q. Let X and Y be two random 32-bit starting sequence numbers chosen by P and Q respectively. Suppose P sends a TCP connection request message to Q with a TCP segment having SYN bit = 1, SEQ number = X, and ACK bit = 0. Suppose Q accepts the connection request. Which one of the following choices represents the information present in the TCP segment header that is sent by Q to P?

A. SYN bit = 1, SEQ number = Y, ACK bit = 1, ACK number = X+1, FIN bit = 0

B. SYN bit = 0, SEQ number = X+1, ACK bit = 0, ACK number = Y, FIN bit = 1

C. SYN bit = 1, SEQ number = X+1, ACK bit = 0, ACK number = Y, FIN bit = 0

D. SYN bit = 1, SEQ number = Y, ACK bit = 1, ACK number = X, FIN bit = 0


P
(client)
Q
SYN=1, SeqNo=X, Ack=0
SYN=1, SeqNo=Y, Ack=1
AckNo=X+1, FIN=0
reply


THANK YOU
GW
SOLDIERS !