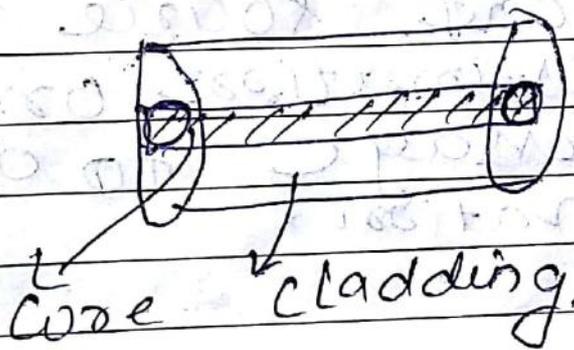1 (a) Serial Line Internet protocol.

(b) Internet Service provider.

(c) Guided is wired transmission in which data signals are guided along a physical path.

Example optical fiber.

Core   cladding.

Unguided is wireless transmission to exchange bits of data

Example microwave

(d)
$$C = B \log_2 \left(1 + \frac{S}{N} \right)$$

channel capacity theorem states that maximum amount of message is received with more loss.

Here

$C =$ Capacity

$B =$ Bandwidth

$\dfrac{S}{N} =$ Signal to Noise ratio

(e) Framing in the data link layer separates a message from one source to a destination or from one message to other destination.

(2) Physical and logical arrangement of computers, Cables, networks, hubs are called topology.

There are basic five types of topology :—

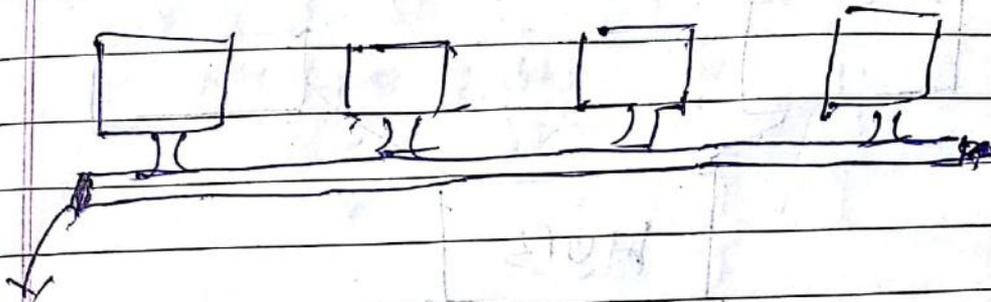(1) Bus topology
(2) Star topology
(3) Ring topology
(4) Mess topology
(5) Hybrid topology.

Bus topology :—

terminator

→ In bus topology all the computers are connected in straight line path.
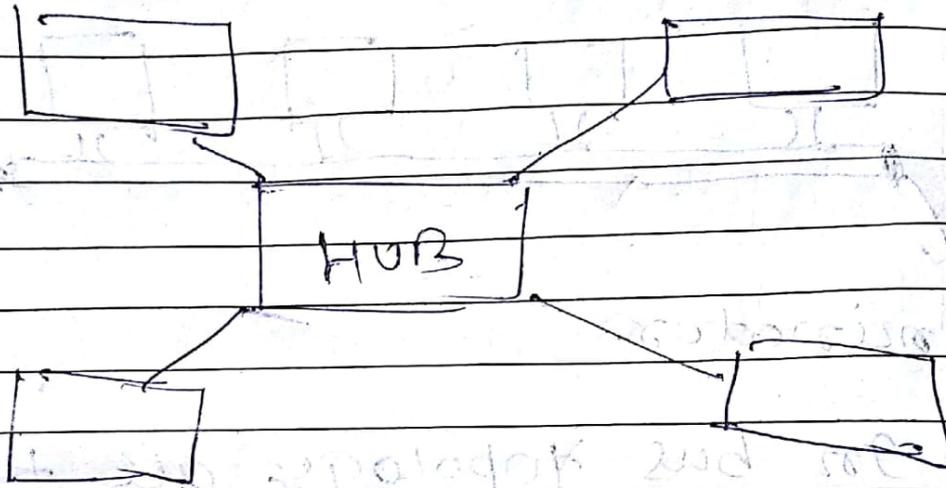
→ ⊕ we need a hardware called terminator to seperates the computers.

→ The disadvantage of bus topology is that if data is block at one stage then another does not carry the process.
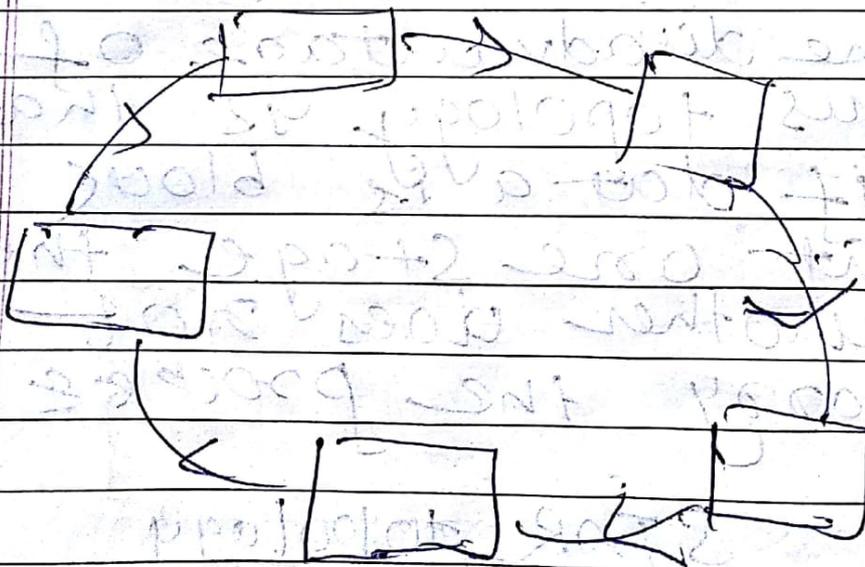
STAR topology

In star topology all computers cables are connected with hubs

Hub is a connecter devices.
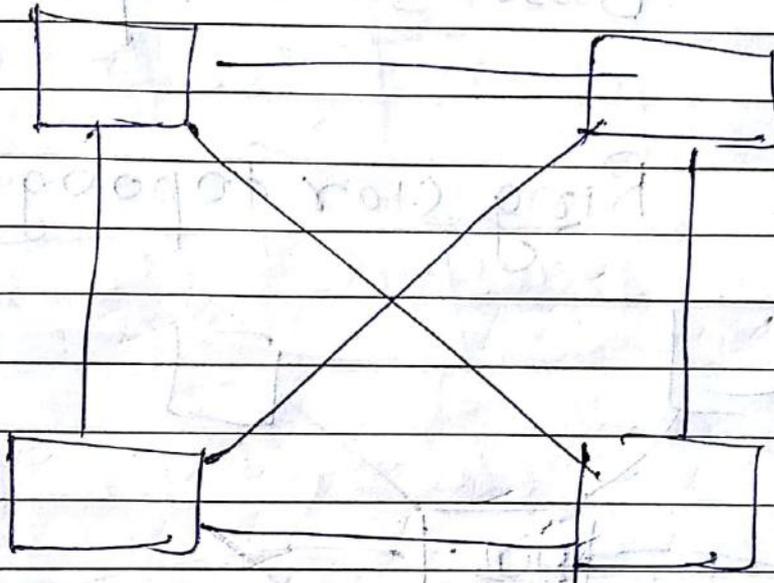

HUB

Ring Topology:

gor ring topology all the
computers / cables are
connected in the

Circular form.
And data are transmitted
in one direction.

Mess topology.

→ In mess topolog all
Computers are connected
with seperates cables.

→ So,there is failed in
the cable their another
will carry their process
that is one best
advantage of the
mess topology.

Hybrid topology

An hybrid topology two or more topology are connected to form hybrid topology.

(1) Ring-star topology
(2) Bus star topology

Ring star topology
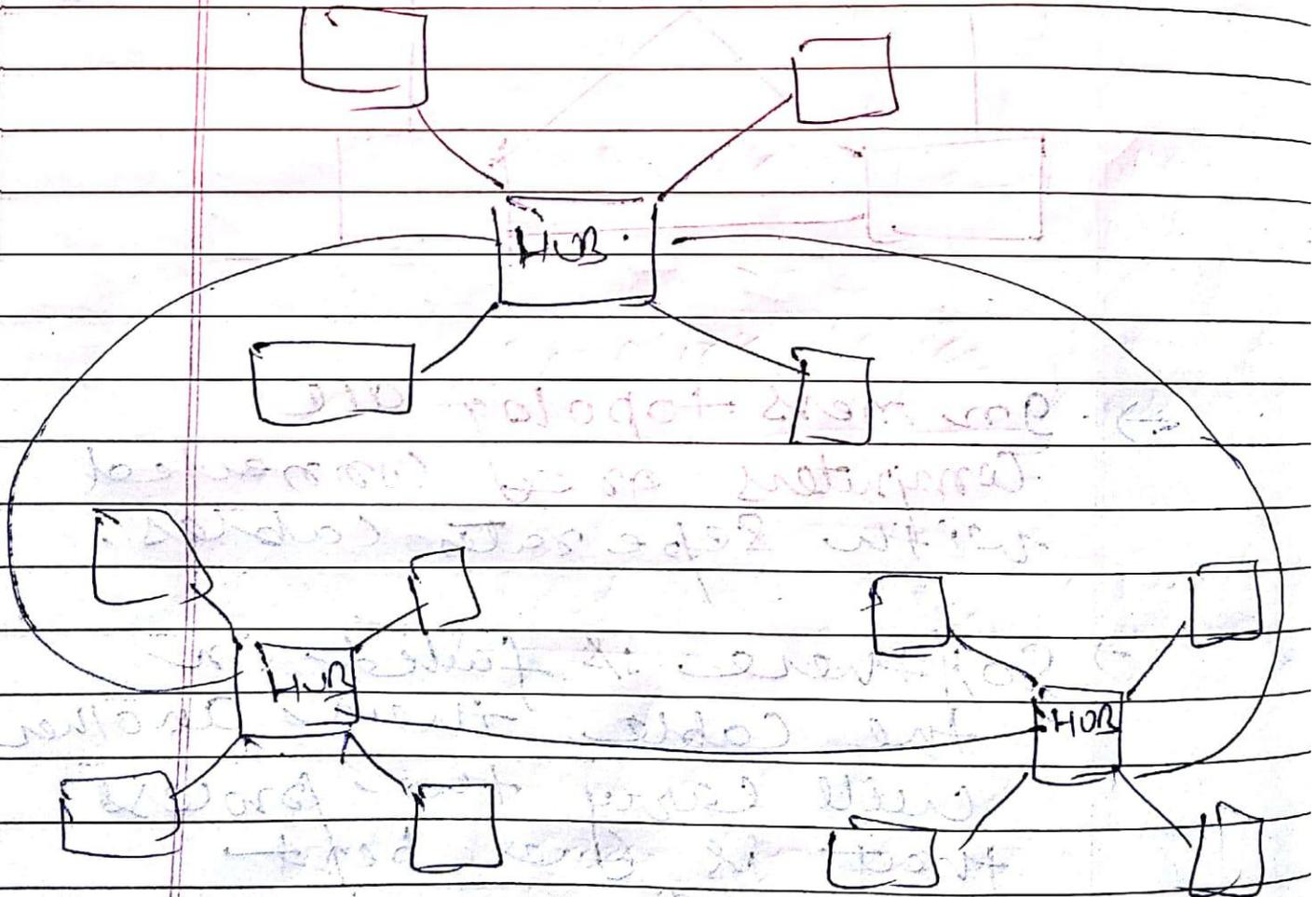
Bus—star topology
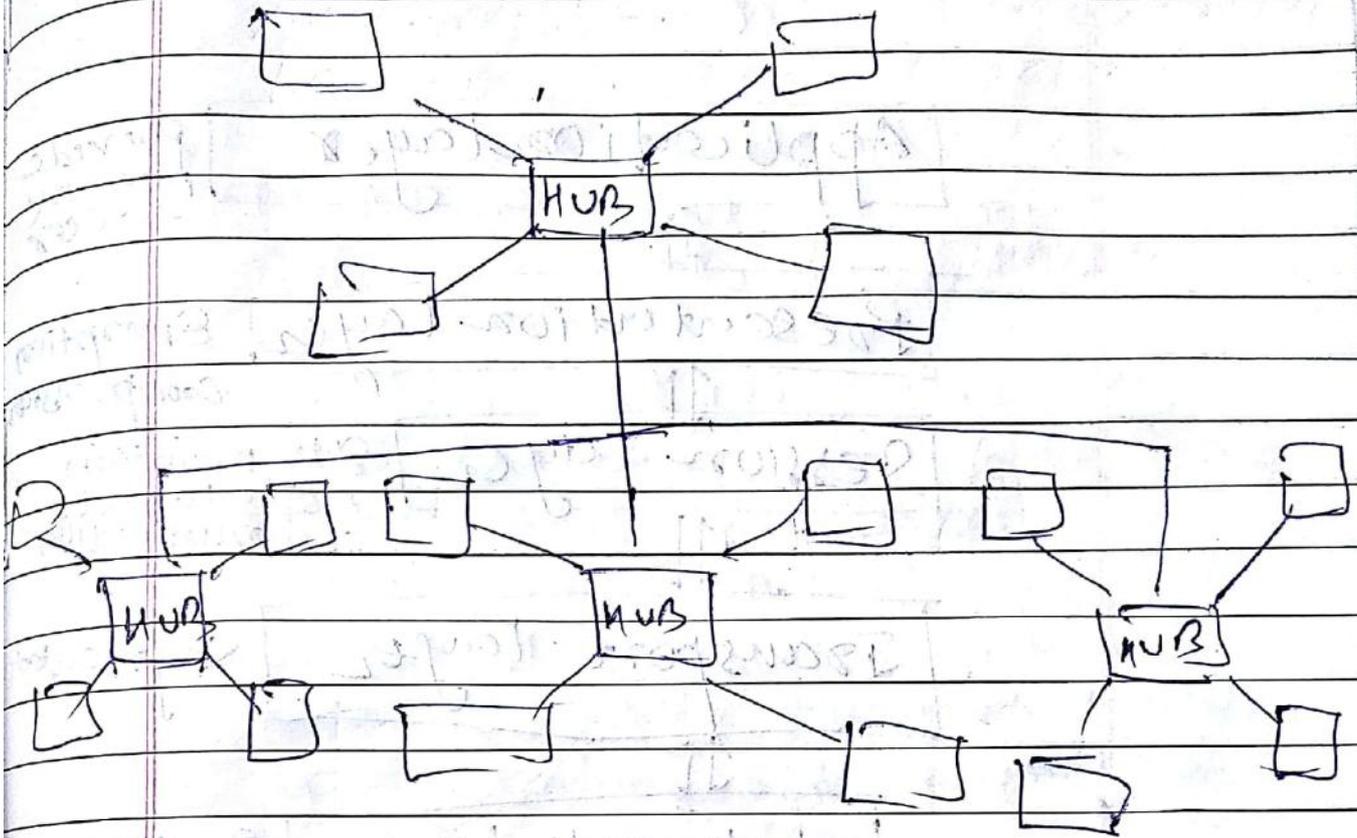
③ OSI Model

→ The term OSI stands for Open System Interconnection

→ It was created by ISO in 1983 for addressing the network problem.

→ The purpose of an OSI model is to show how to facilitate communication between different System without requiring changes

to the logic of the hardware
and software.

Layer	Function
Application Layer	Provide Network to user
Presentation Layer	Encryption Compression
Session Layer	It maintain node to node communication
Transport layer	Segmentation
Network layer	Routing, Logical addressing
DATALINK layer	Framing Access control flow control
physical layer	Data rate line configuration
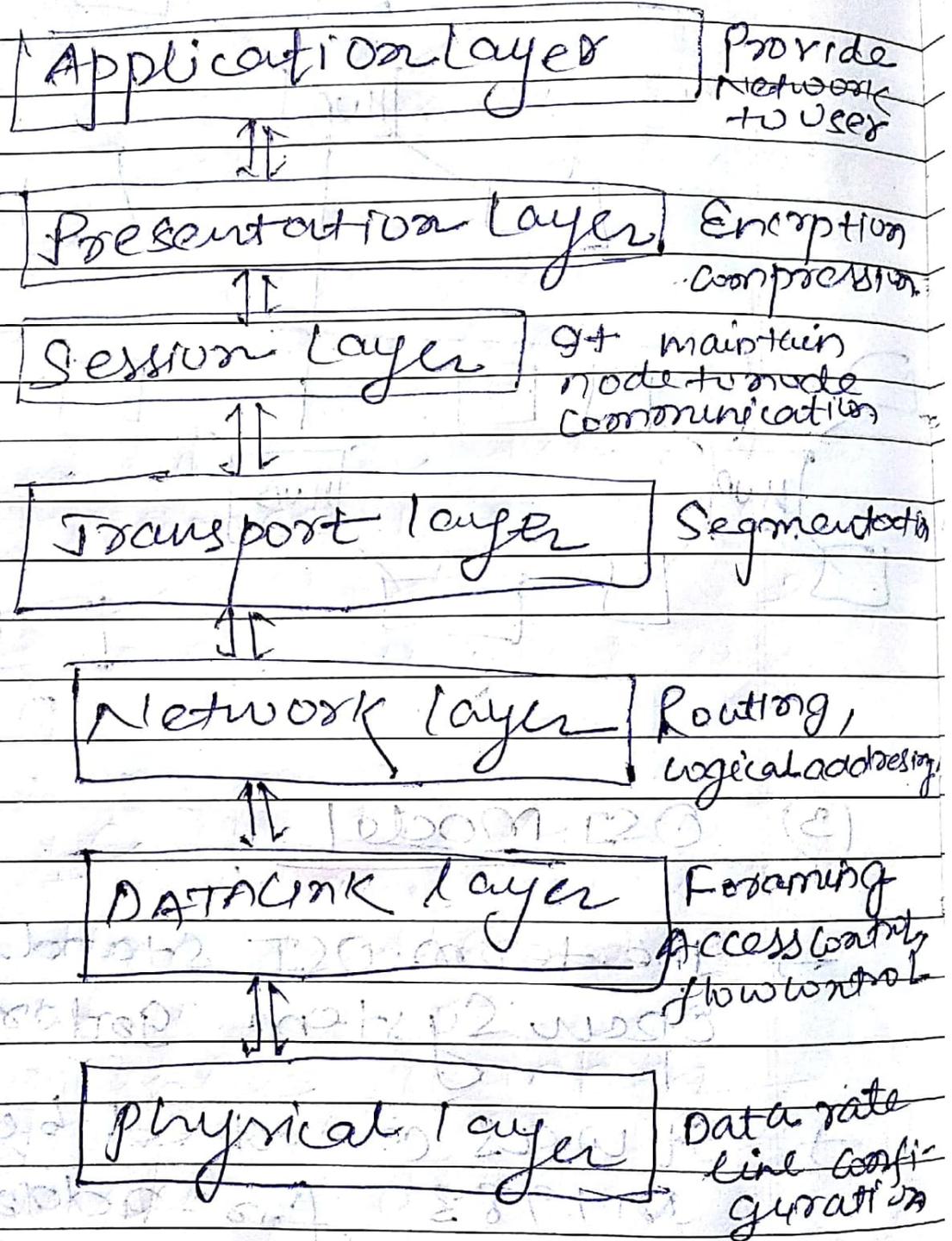
OSI model has seven layer.
and each layer is
connected with each
other

Difference between OSI &
TCP/IP model are the
followings:—

TCP/IP

OSI	TCP/IP
(1) It has seven layer	It has five layer
(2) Network layer is both connection oriented & connection less	Network layer is connection less
(3) OSI Model has seperate presentation & Session layer	TCP/IP does not have a separate presentation layer or or session layer
(4) Transport layer is connection oriented	Transport layer is both connection oriented and connection less
(5) It is less reliable	It is more reliable

(4) <u>Sliding Window</u>

→ Sliding windows refers to imaginary boxes at the transmitter and receiver

→ This window holds the frame at either end, and provides the upper limit on the number of frames that can be transmitted before requiring an acknowledge.

→ So, in short we can say that, at any instant of time the sender maintain a set of sequence number corresponding to the frames it is permitted to send.

→ Sequence number :—

One of the most important features of all the sliding window

protocols that each outbound frame contains a sequence number, ranging from 0 to $2^n - 1$

→ The value of n can be arbitary.

→ These frames which are being permitted to sent are said to be falling in the sending window.
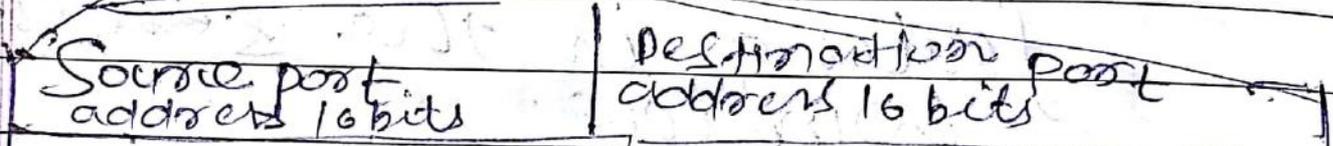
→ The receiver also maintains a receiver window.

→ It corresponds to the set of frames it is permitted to accept

→ The acknowledge should be used after every frame.

→ In order to improve the efficiency the sender sends multiple frames at time.

(5)
(a)

Header	Data

Source port address 16 bits	Destination port address 16 bits
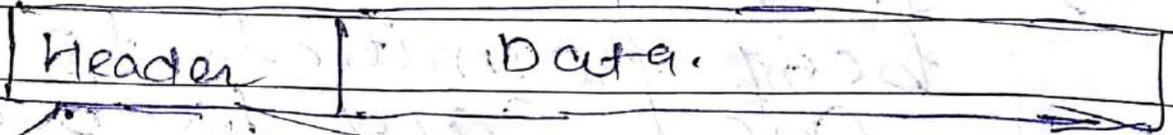
Sequence number 32 bits

Acknowledgement number 32 bits

HLEH 4bit	Reserved 6bits	U R G	A C K	P S H	R S T	S Y N	F I N	window size 16 bits

Check sum 16 bits	Urgent pointer 16 bits

Options and padding

(6) IPV/4

The internet protocol version 4
(IPV4) is the delivery
mechanism used by the TCP/IP
protocols.

← 20-60bytes.

| Header | Data |

VER 4bits	HLEN 4 bits	Servio 8 bits	Total length 16 bits	
Identification 16 bits			Flag 3 bits	Fragmentation offset 13 bits
Time to live 8 bits		Protool 8 bits	Header Checksum 16 bits	
Source IP address				
Destination Ip address				
Option				

← 32 bits →

IpV 6

VER	PRI	Flow label		
Payload			Nextheader	Hoplimit
Source address				
Destination address				
Next header	Header length			

Next header	Header length

Next header	Header length

IPV6 also Known as IPng
(Internetworking protocol,
next generation)

IPV6 address is 128 bits long

IPv 6 uses a new header
format in which options are
separated from the
base header and inserted

(C) Bit staffing is the process of adding one extra /0 when-ever five consecutive is follows a 0 in the data, so that the receiver does not mistake the pattern 011111 10 for a flag.

Byte Stuffing

Byte stuffing is the process of adding 1 extra byte whenever there is a flag or escape character in the text
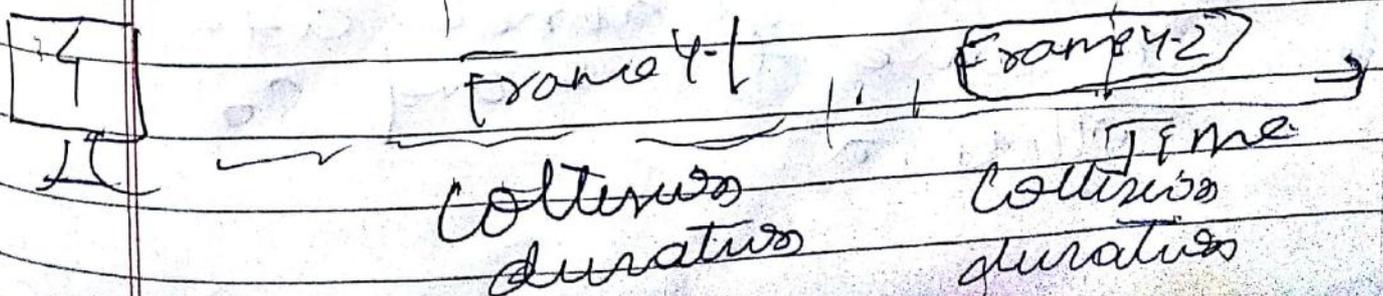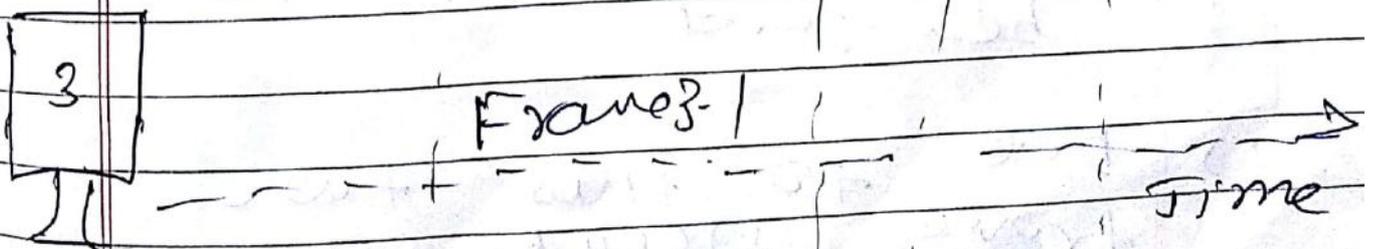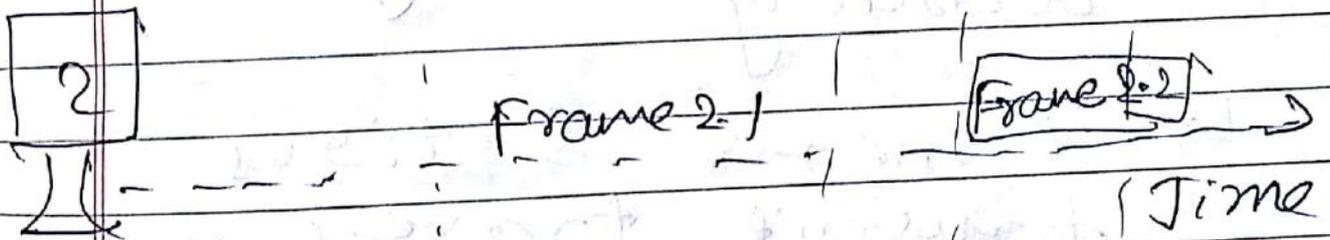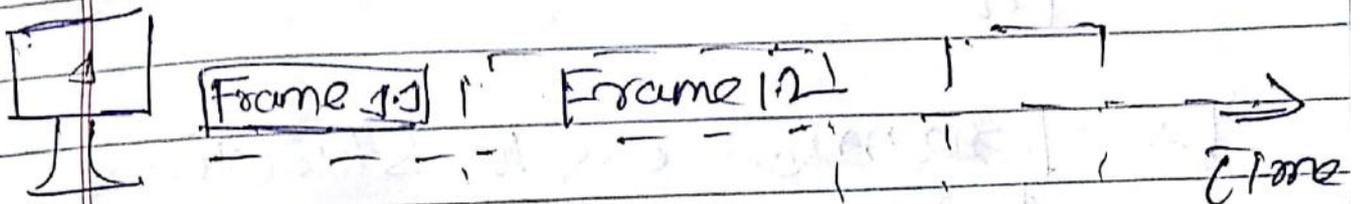
ALOHA

6

→ The earliest random access method.

→ Random access method means no station is superior to another station.

→ And none is assigned to control over another.

→ It has developed at the University of Hawaii in 1970.

→ It was developed for LAN, but it can be used on any shared medium.

→ The original ALOHA protocol is called pure ALOHA.

→ It is simple, but elegant protocol.

Frames in a pure ALOHA network :-

```
[1]     | Frame 1.1 |   | Frame 1.2 |          |          |          →
                                                                  Time

[2]                        Frame 2.1              | Frame 2.2 |  →
                                                          Time

[3]                        Frame 3.1                             →
                                                          Time

[4]                        Frame 4.1     | Frame 4.2 |  →
                                                     Time
              Collision          Collision
              duration           duration
```

↳ It does not require global time synchronization

↳ ® Uniform frame size is used in it.

↳ Uniform frame size increases the throughput of ALOHA system.

→ There are four station in

↳ ~~Frame~~ each Station transmitting of frame are complectly arbitary

↳ It means Stations transmit frame when they have data to be sent.

↳ Due to this two frame occupy the same channel at a same time and So Collision

Pure	Slotted
① Frames transmitted At Arbitary times	Frames transmitted at discrete time
② $S = G e^{-2S}$	$S = G e^{-S}$
③ Utilization $= 18.4 /-$	Utilization $?$
④ Does not require global time	It requires Global time
⑤ It is not used in satelites	It is used broadcast s...
⑥ Vulnerable time $2 \times T_{fr}$	Vulnerable T_{fr}.