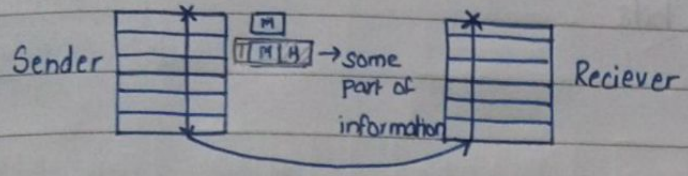
CNS – Computer Networking System

⇒ Protocols :-

Set of rules for any two parties to communicate and both the parties should agree to follow those rules for successful communication.



Message Transfer

The message goes ~~the~~ through the different levels of the system (sender) and from the lowest level of the system the message is transferred to the reciever.

⇒ Intranet :

⇒ Internet :

⇒ Network Architecture : Layered Architecture

1) ISO OSI Reference Model [Not used in real time]
2) TCP/IP Model ⇒ 4 Layers (collection of Protocols)

International Standards Organization (ISO)
Open System Interconnection (OSI)

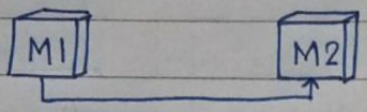
Layers ⇒	Application
	Presentation
	Server
	Transportation
	Network
	Data Link
	Physical

NISE - Significance

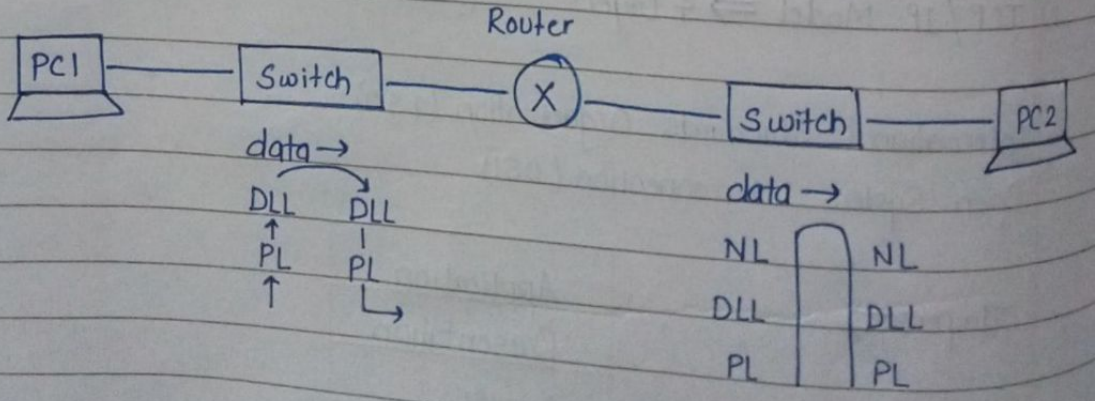
Physical Layer : Transmission of bits (raw)
e.g: In cables message is in the form of bits

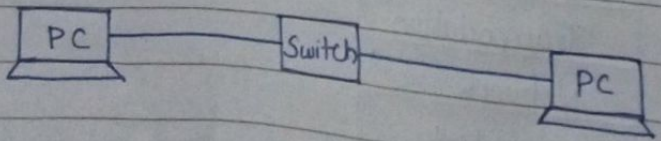
→ Electrical & Mechanical interface
→ Procedures & Functions : Transmission of data
eg: procedure for sending bits

Data Link Layer:



→ Framing : Collection of bits
→ Error Control Techniques
→ Flow Control
→ Access Control
→ Physical Addressing (Identification of Machine)
Medium Access Control (MAC)



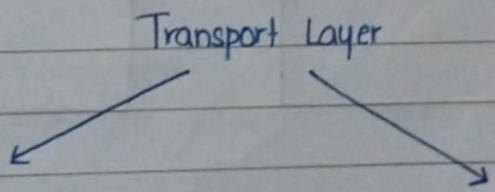


Network Layer:

Responsible for creating connection between source computer & destination computer.
The communication and network layer is ~~post to post~~ host to host

Transport Layer

- end to end / port to port delievery
- the logical connection at transport layer is also end to end
- Transport layer and source gets the message from application layer and encapsulates it in transport layer called segment and sends it through the logical connection to the transport layer at the destination post.



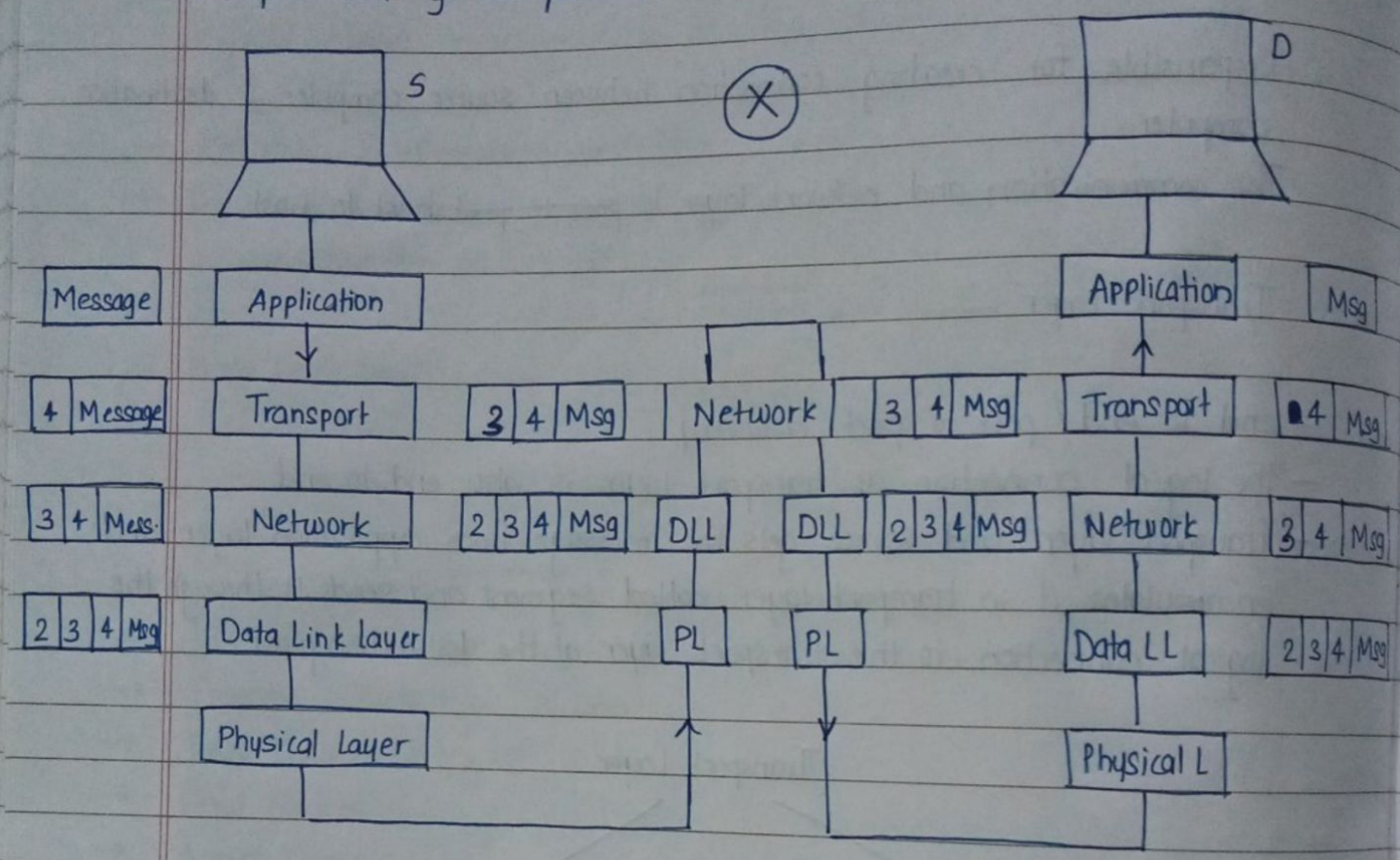
TCP
(Transmission Control Protocol)

UDP
(User Datagram Protocol)

Application Layer

- end to end delievery / process to process delievery
- http (hypertext transfer protocol)

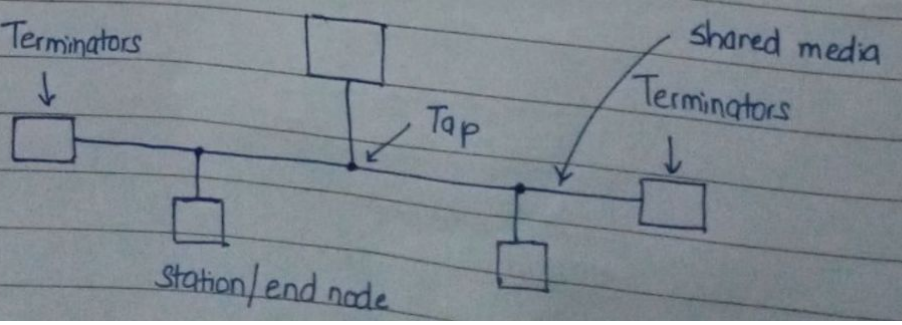
Encapsulation & Decapsulation



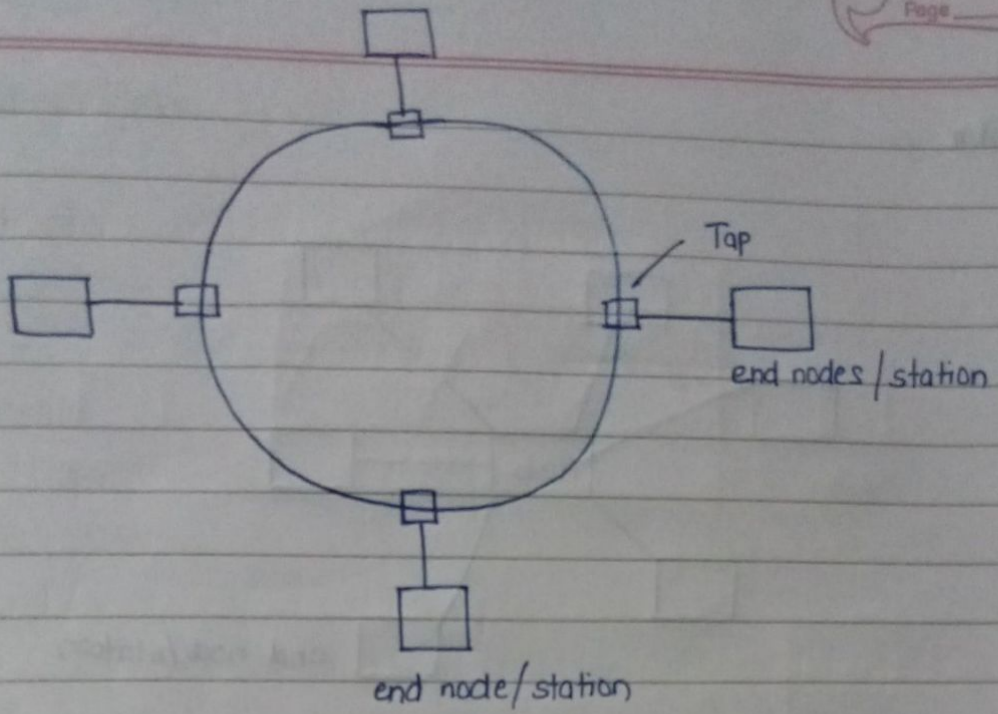
Network Topology

- Bus
- Ring
- Tree
- Mesh
- Star

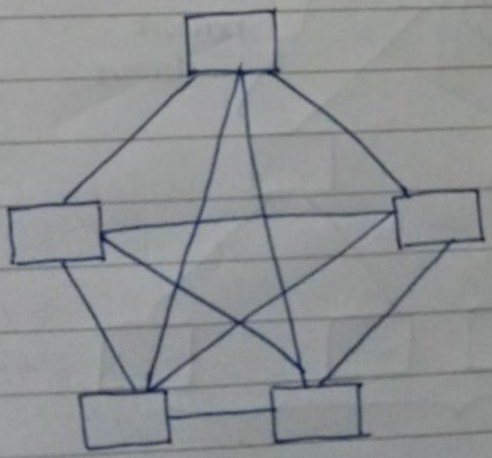
① Bus Topology



② Ring:

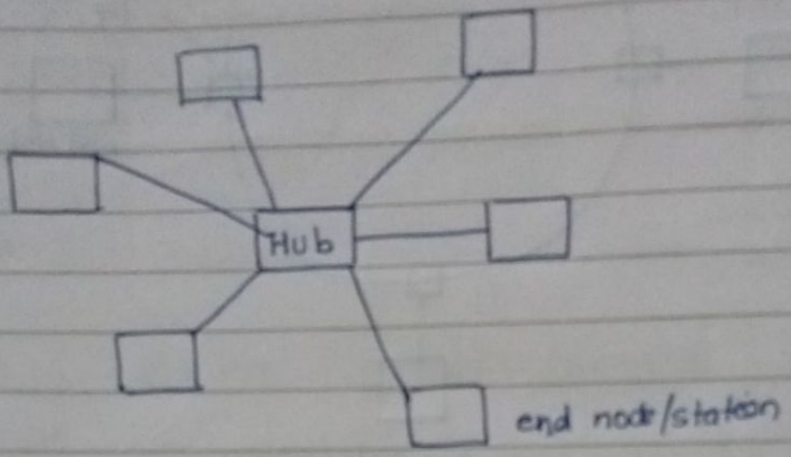


③ Mesh:

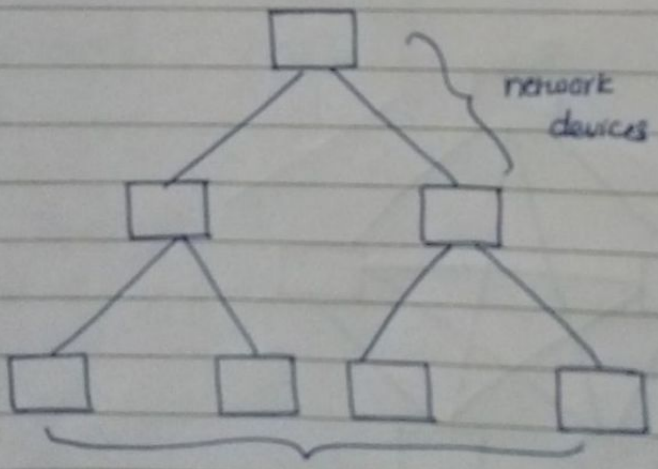


$$\frac{n(n-1)}{2}$$

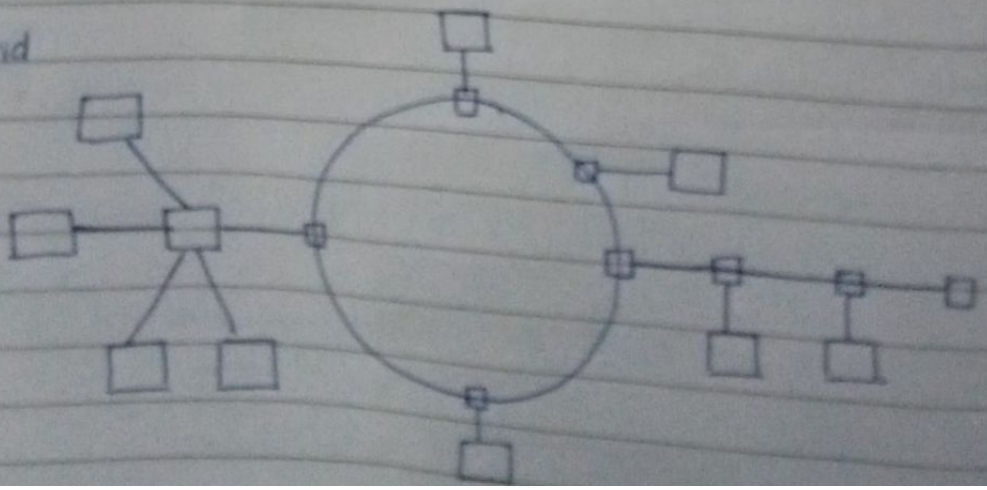
④ Star



⑤ Tree



⑥ Hybrid

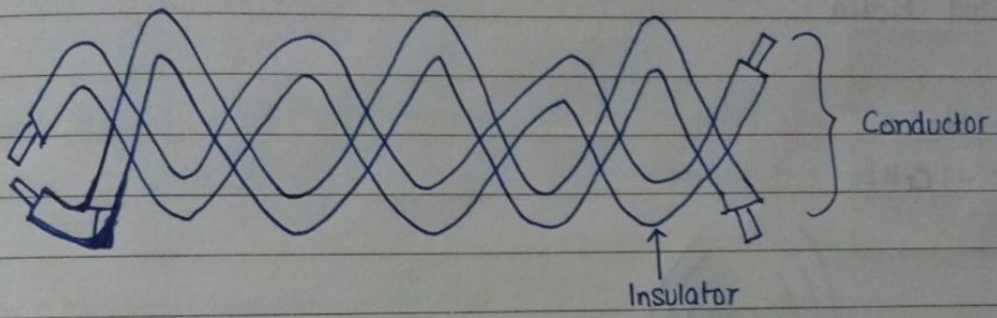


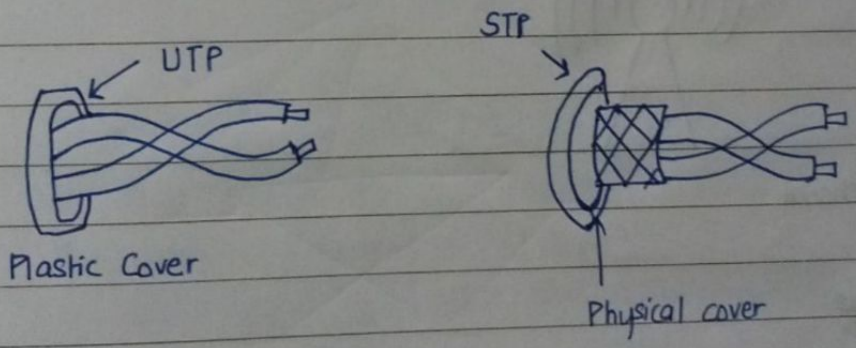
Transmission Media

1) Guided Media
2) Unguided Media

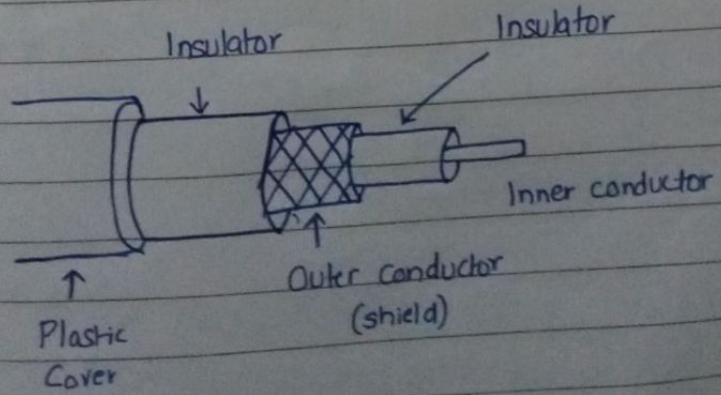
Guided Media

1) Twisted pair cable — UTP / STP

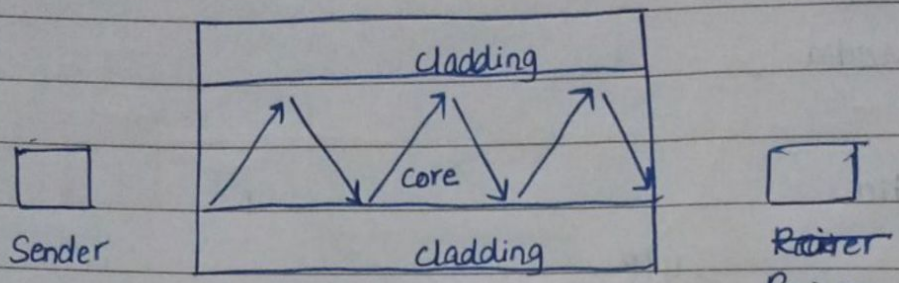




2) Coaxial cable



3.) Fibre optics



2.) Unguided Media

i. Radio Waves

— 3kHz - 1GHz

— Omnidirectional

ii Microwaves

— 1 - 300GHz

— Unidirectional

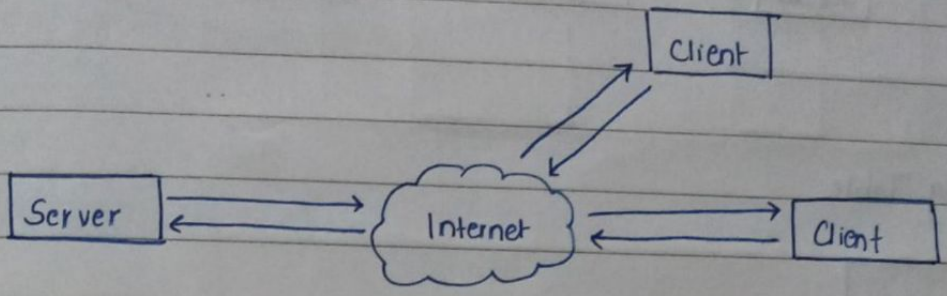
iii. Infrared

— 300GHz - 400 THz

Network Architecture

Peer to Peer

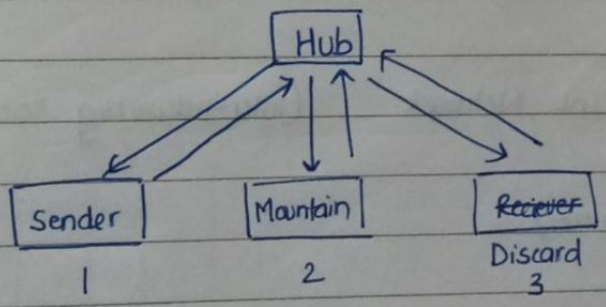
Client/Server



Network devices

Repeater

Hub - Multiport reporter ~~(Physical~~

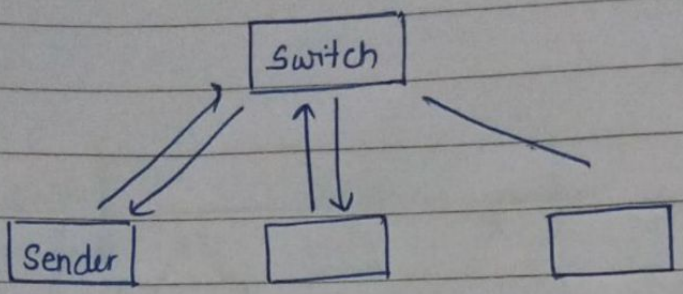


Bridge - Repeater with filtering capacity

- PL & DLL
- I/O → 2ports

Switch

- Multiport bridge
- filtering



- Switching Table

Port	MAC
1	
2	
3	

PL & DLL →

- Router - Physical, Data Link, Network (inter-networking connection)
- Gateway (protocol controller)
- Line Coding - Sending data to physical layer through line coding

1.) Unipolar - positive voltage, one voltage

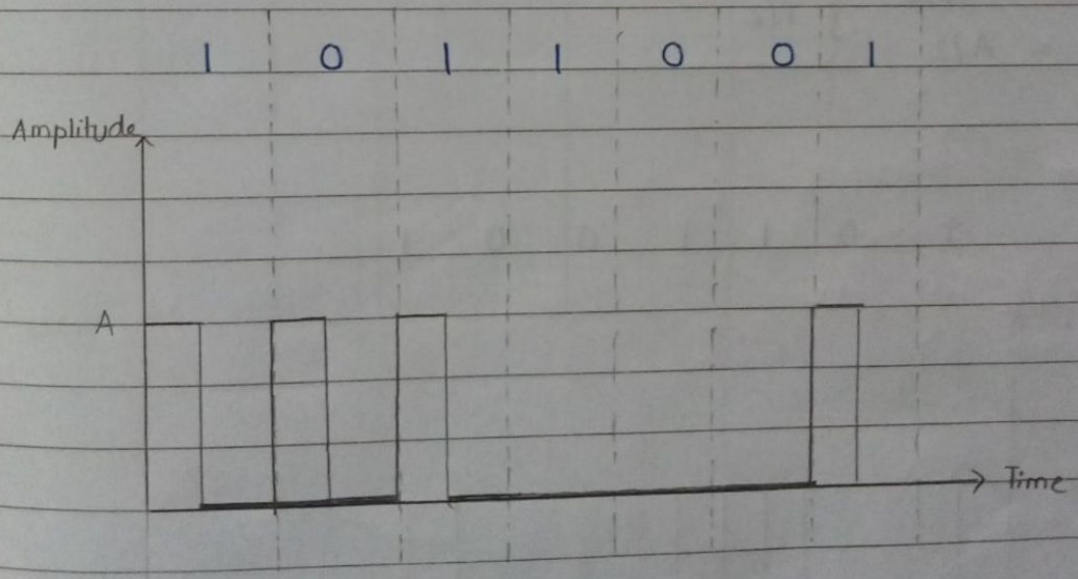
NRZ (Non Return to Zero) RZ (Return to Zero)

2.) polar — RZ
NRZ
Manchester

3.) Bi-polar — AMI
Pseudoternary

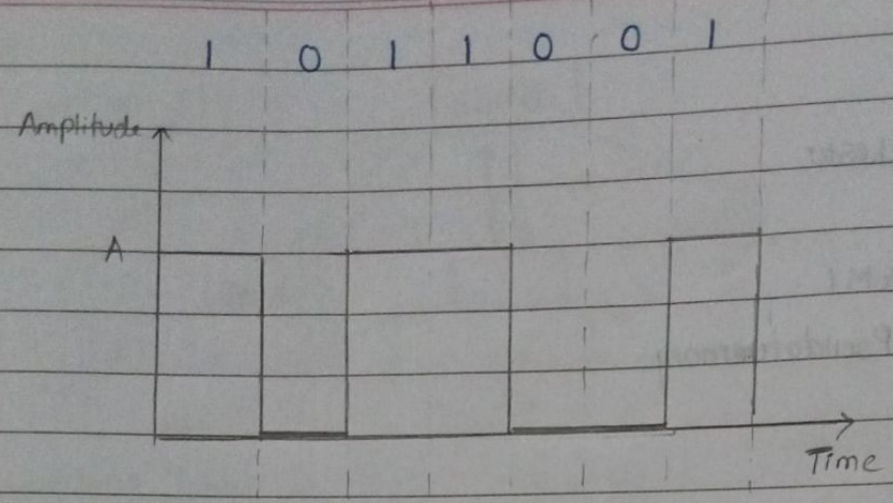
1.) i) Unipolar RZ (Return to 0)

0 ⇒ off pulse a = 0
1 ⇒ on pulse a = A
} T (time duration) = T/2



ii) Unipolar NRZ (Non-Return to Zero)

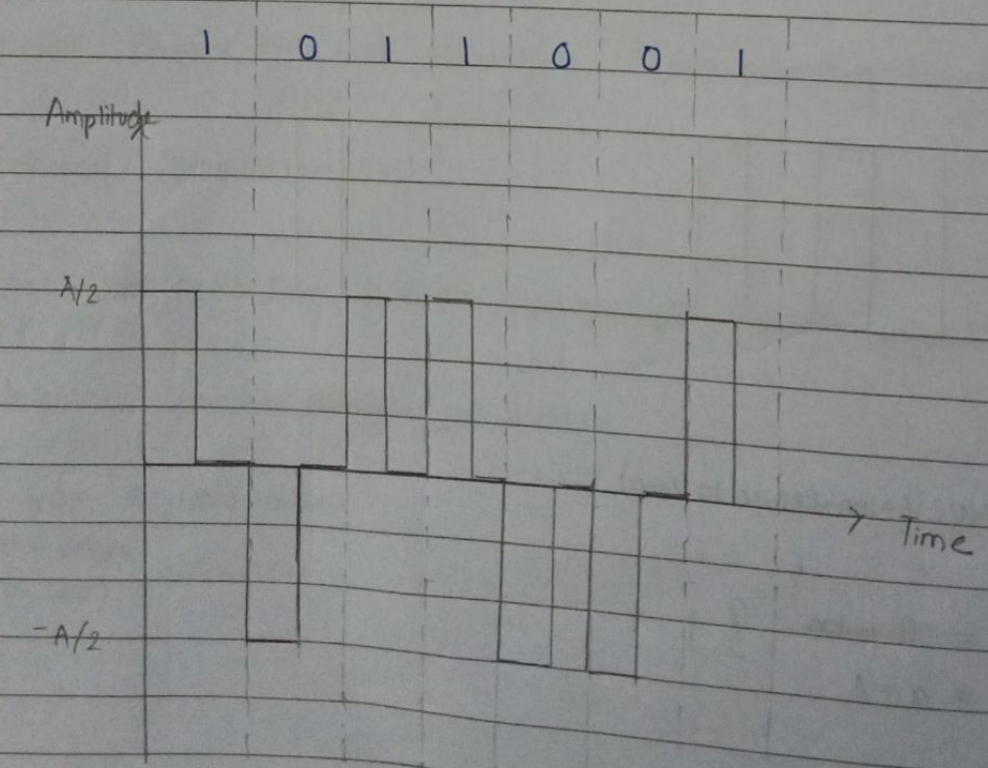
0 = off pulse
1 ⇒ a = A
} T = T



Polar RZ

$+A/2$, $-A/2$

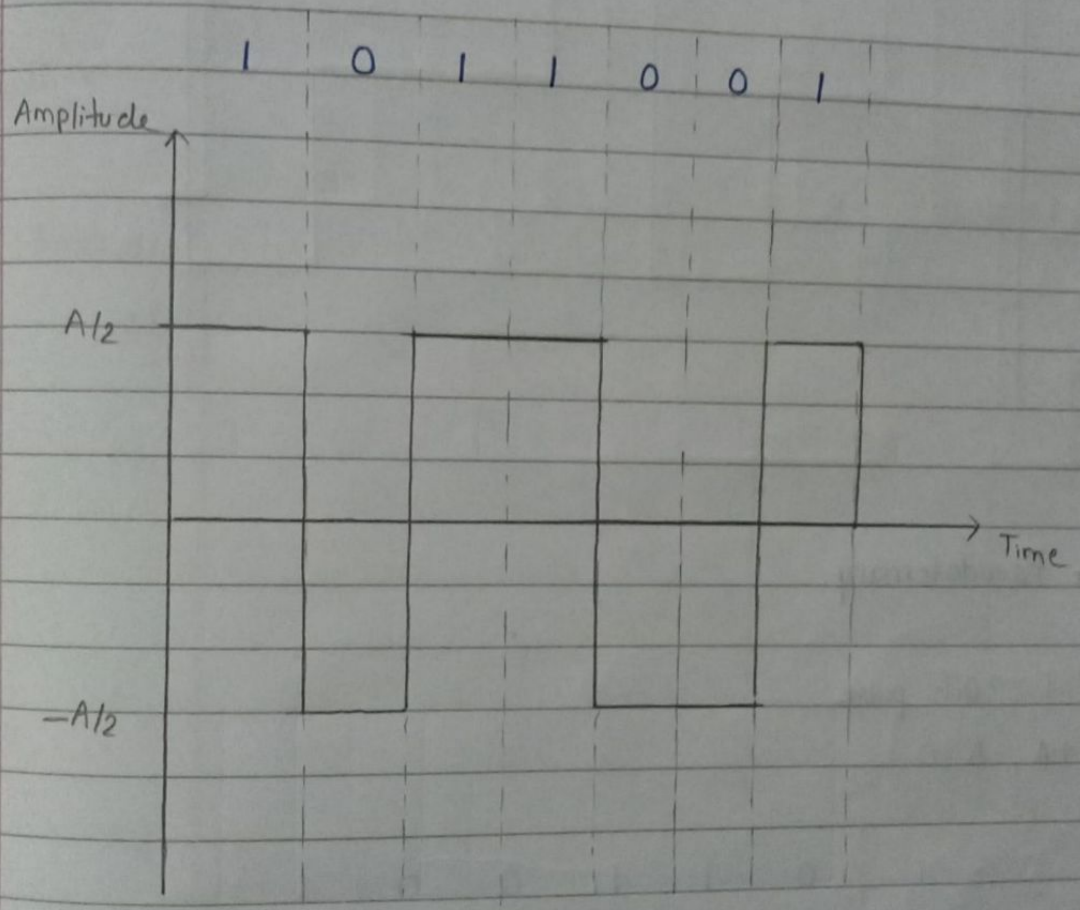
0 = $-A/2$
1 = $A/2$
} $T/2$



Polar NRZ

$+A/2$, $-A/2$

$0 = -A/2$
$1 = A/2$ } T

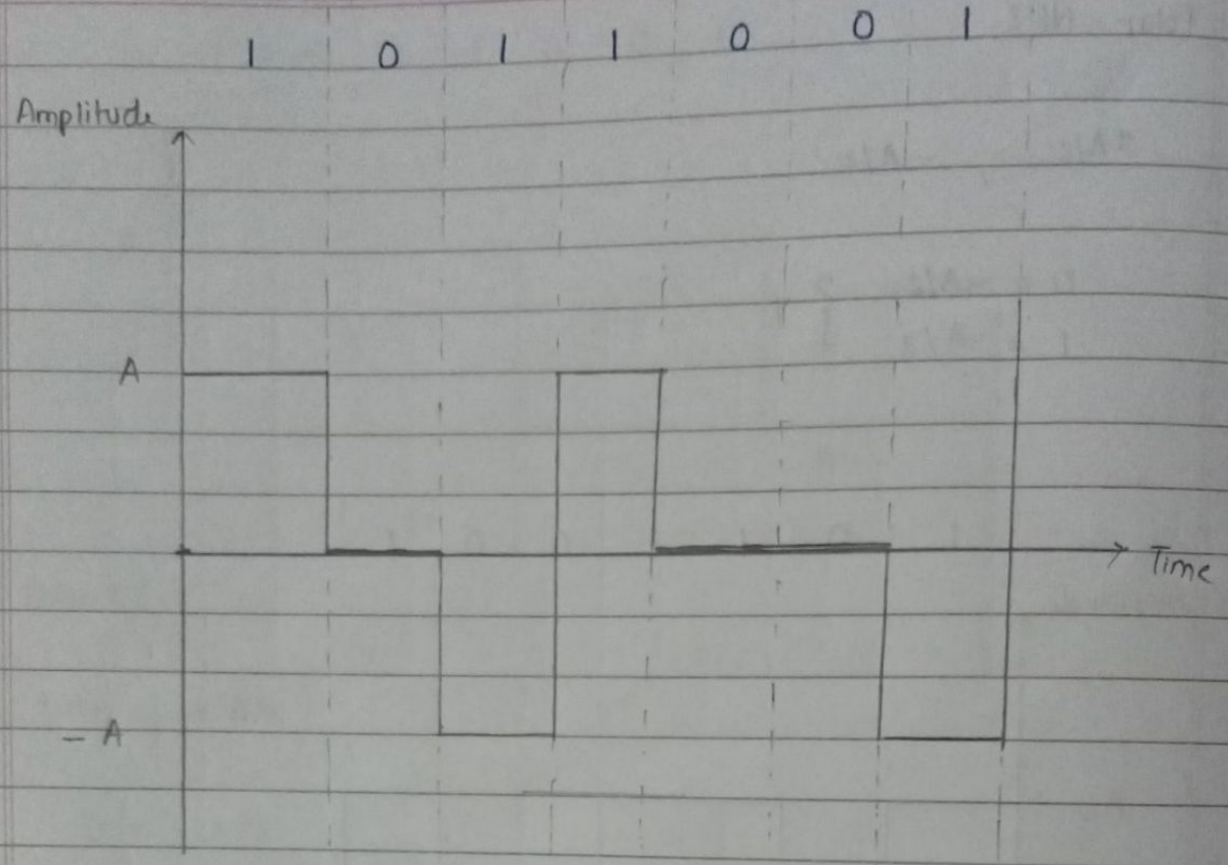


Bipolar

AMI → Alternate Mark inversion

+A , -A , 0

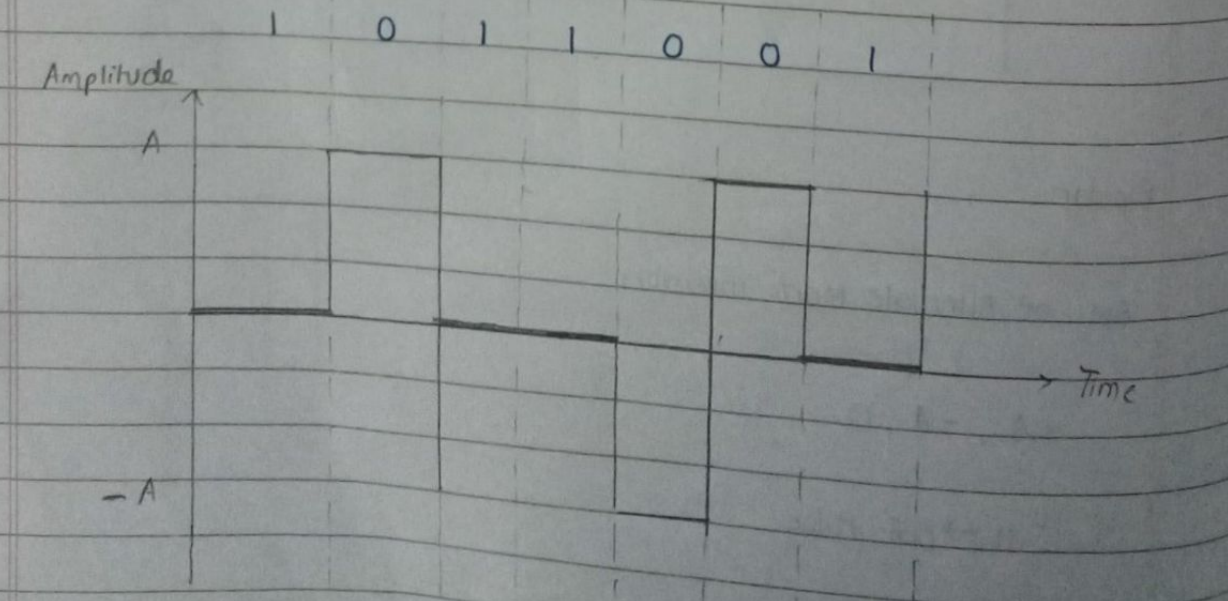
0 → Off Pulse



~~Bipolar~~ Pseudoternary

1 → off pulse

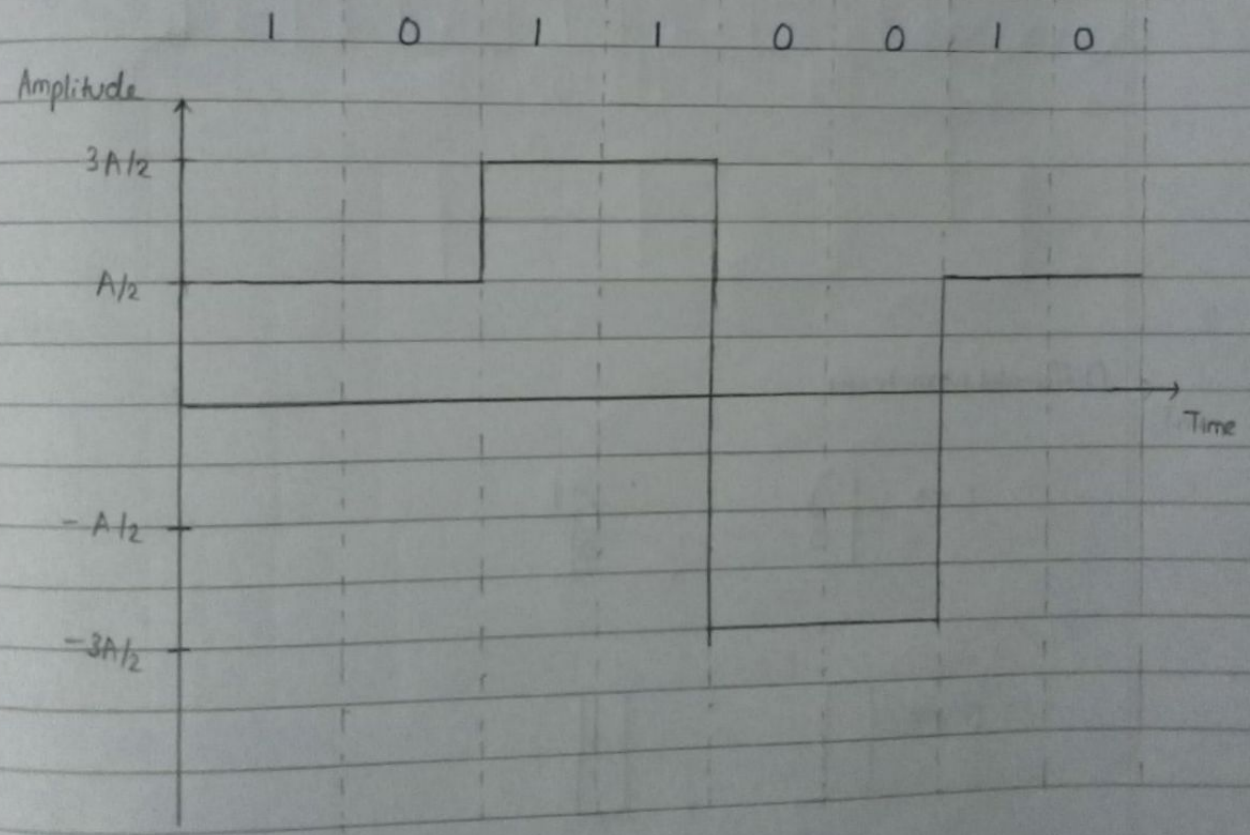
+A, -A, 0



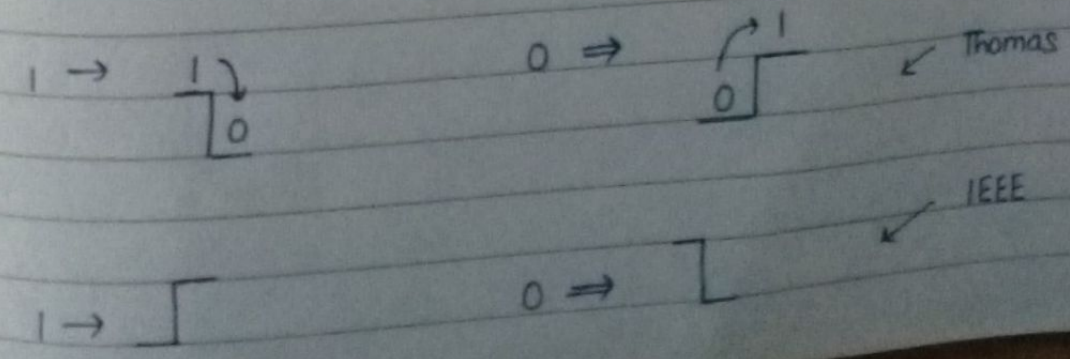
Multilevel

Quaternary NR2

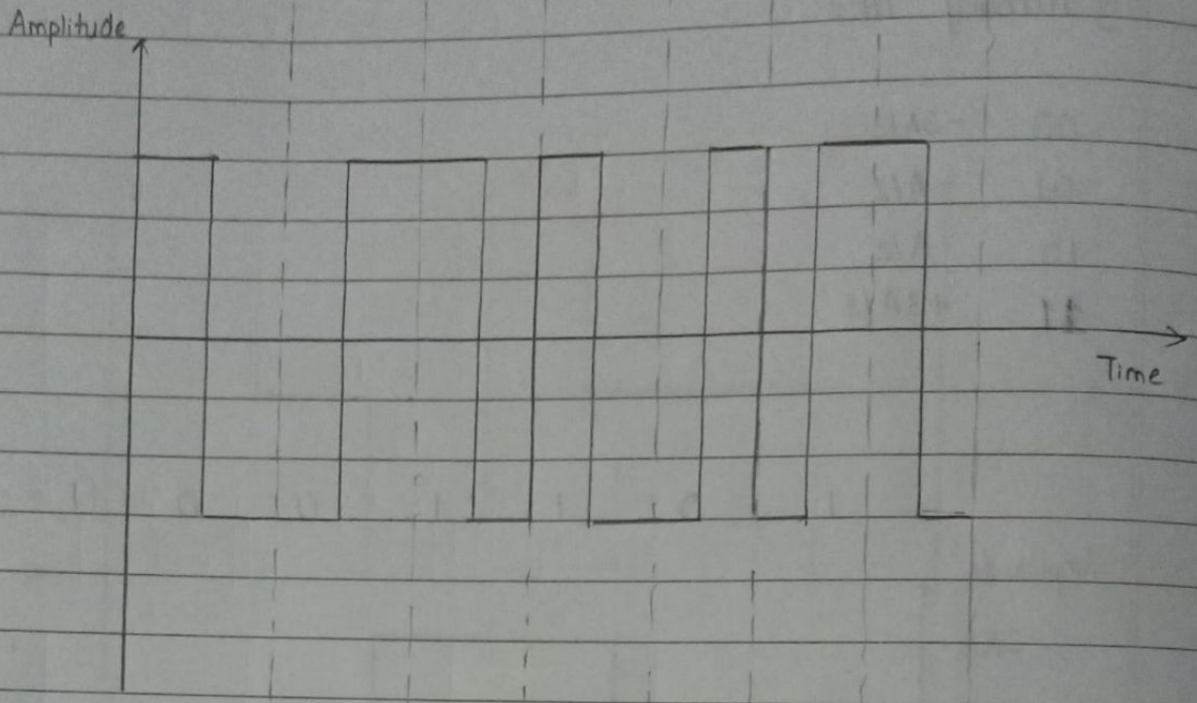
00	$-3A/2$
01	$-A/2$
10	$A/2$
11	$+3A/2$



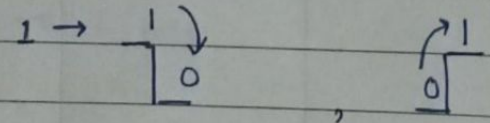
Manchester

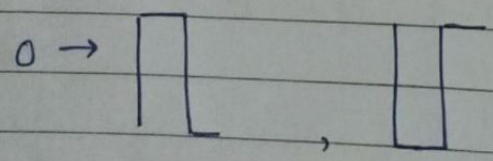


1 0 1 1 0 0 1 0

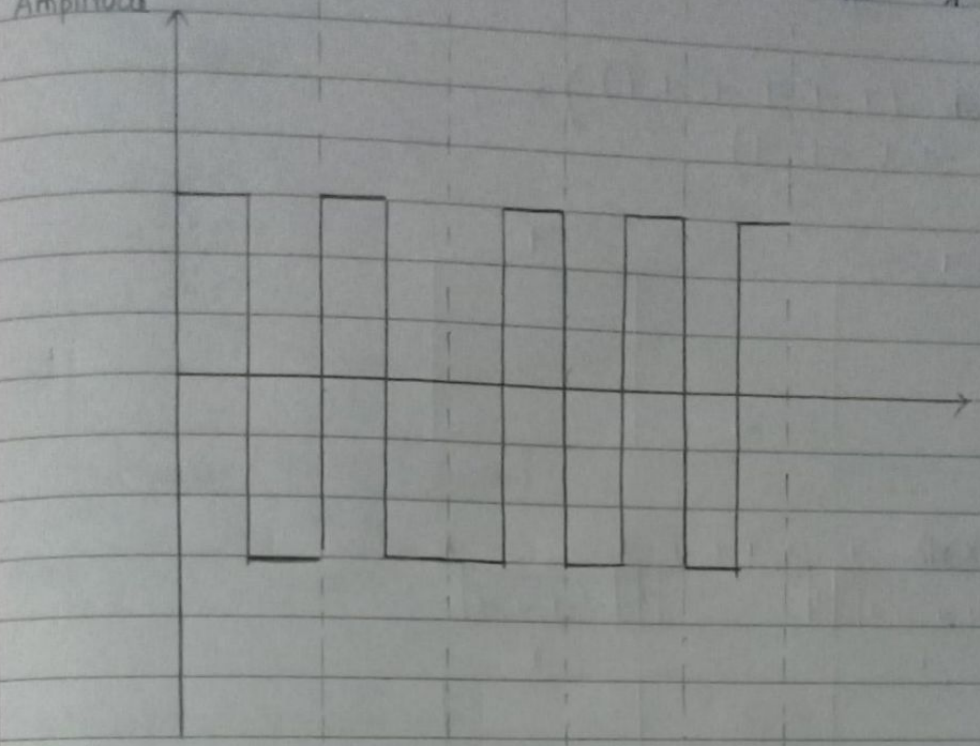


Differential Manchester





1 0 1 0 0 0 1



FHSS