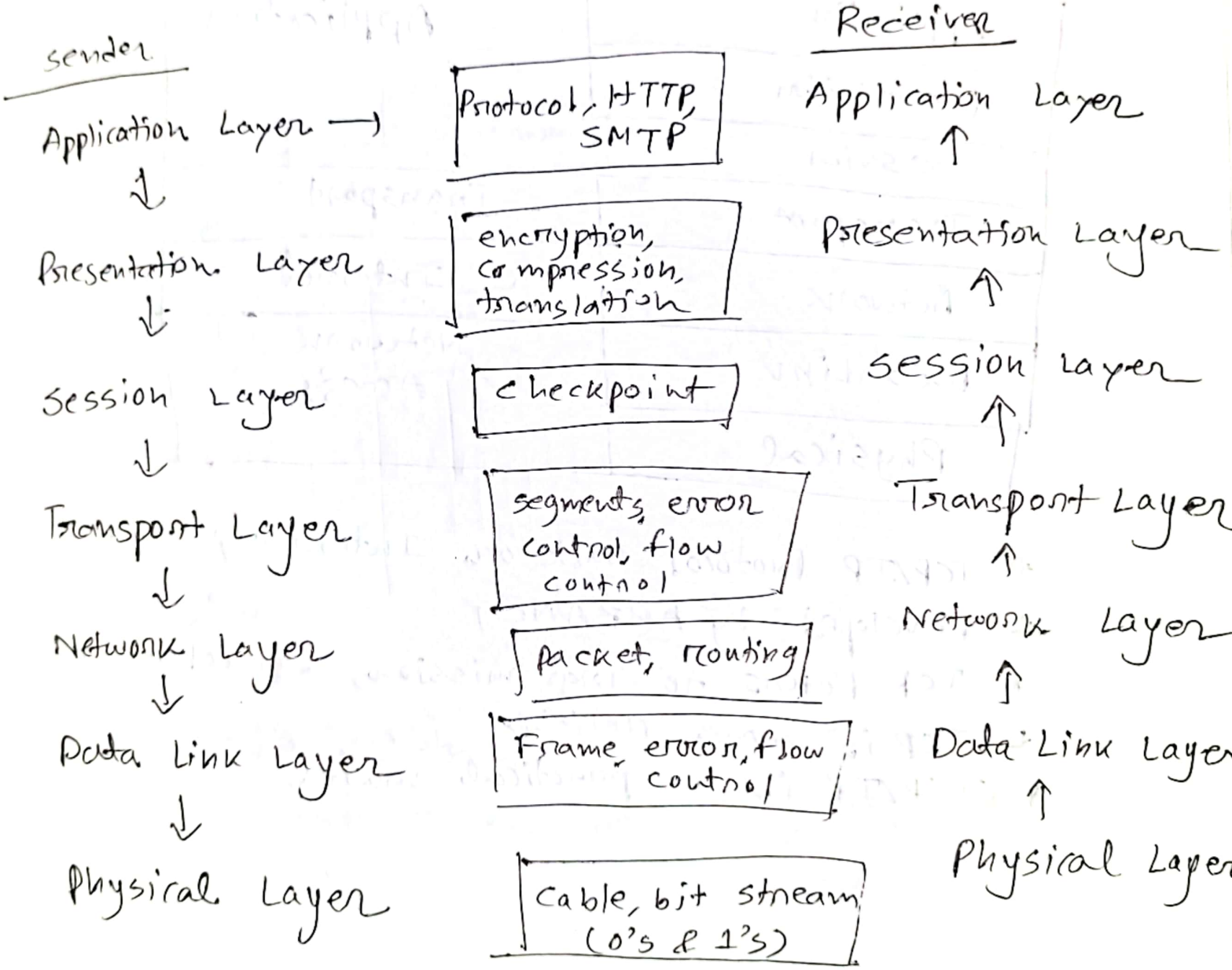
CSE 303

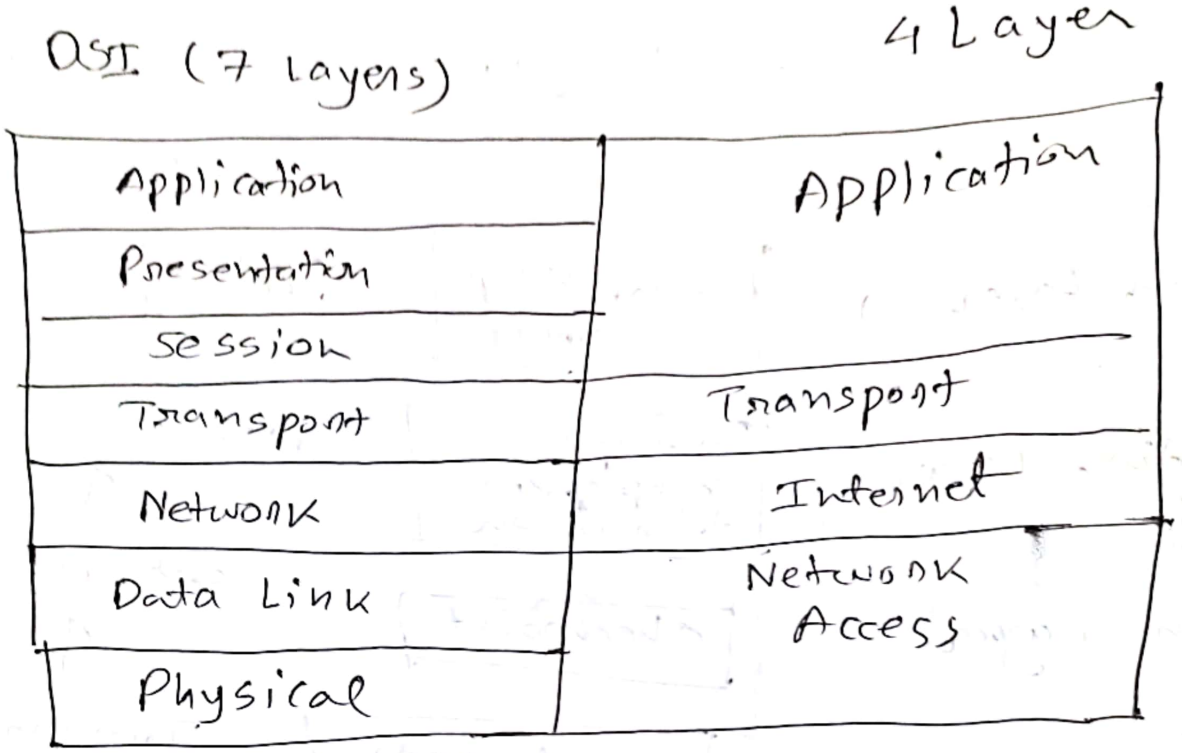
Outside note

The OSI MODEL



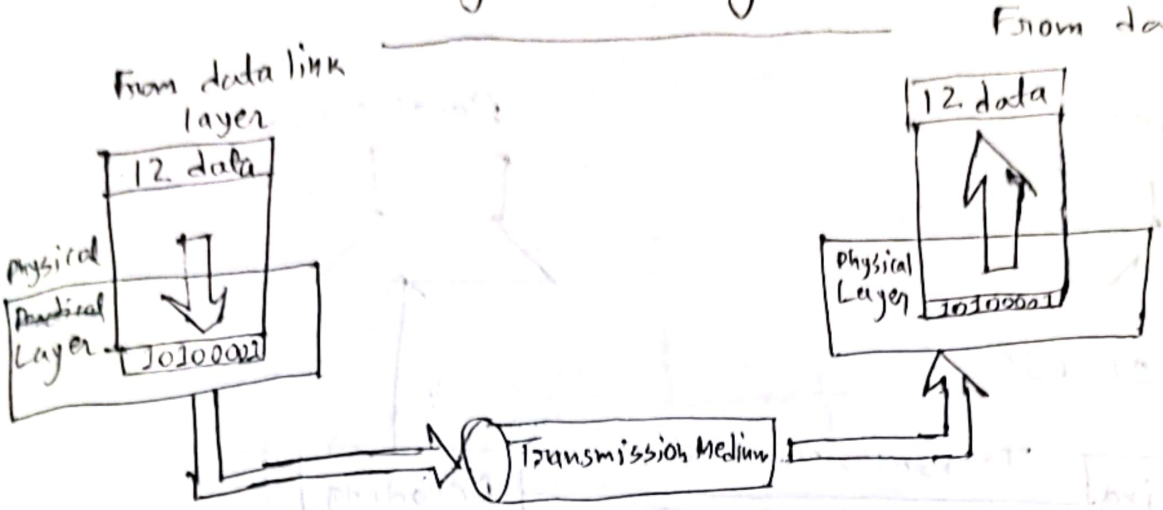
Sadman

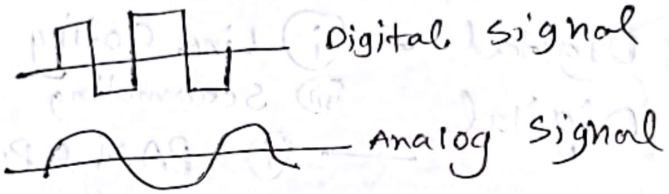
TCP/IP Protocol suite



* TCP/IP Protocol suite on Internet protocol
* Developed by ARPANET
* TCP Refers to Transmission Control Protocol
* TCP is more reliable
* TCP/IP is a practical model

Physical Layer

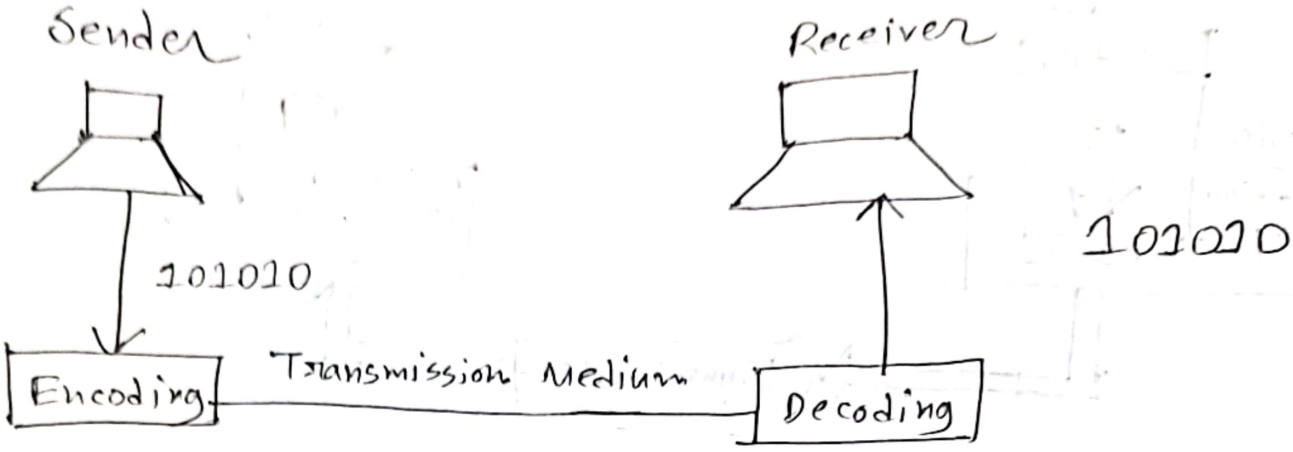




Features:

(i) Representation of Bits (Encoding)
(ii) Interface & Medium
(iii) Data Rate
(iv) Synchronization of Bits
(v) Line configuration (Point-to-Point, Multipoint)
(vi) Topologies
(vii) Transmission Modes (simplex/half-duplex/full-duplex)

Digital Transmission



Digital to Digital — (i) Line Coding (ii) Block Coding, (iii) Scrambling

Analog to Digital —
(i) PAM (Pulse Amplitude Modulation)
(ii) PCM (Pulse code Modulation)

Line Coding

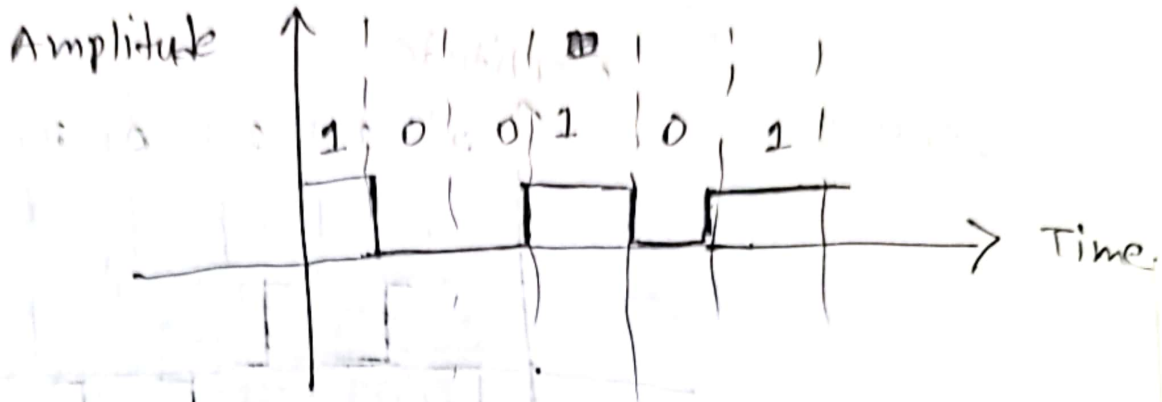
(i) Unipolar
(ii) Polar
(iii) Bipolar
(iv) Multilevel
(v) Multi-Transition

Unipolar:

Positive Voltage → 1 (UP)

Zero Voltage → 0 (DOWN)

100101



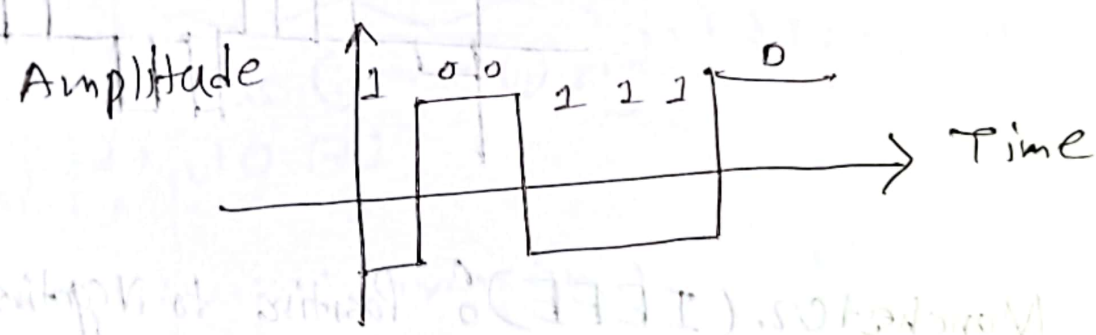
[Polar]

NRZ- Non return to zero

NRZ-L:

Positive Voltage → 0

Negative Voltage → 1

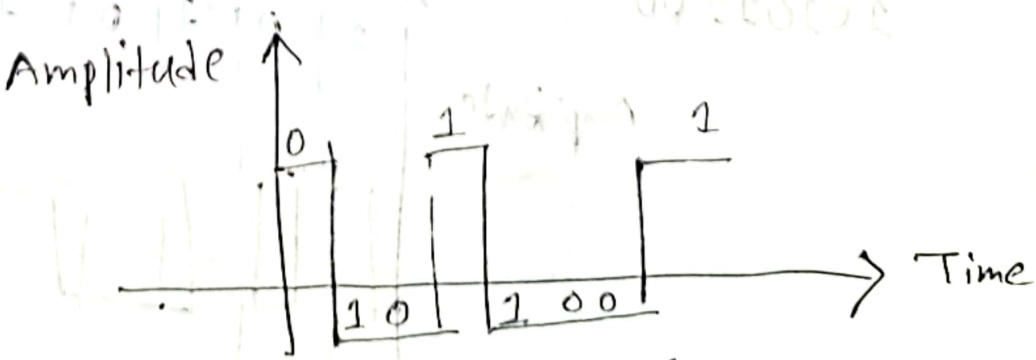


1001110

NRZ-I:

Transition → 1

No Transition → 0



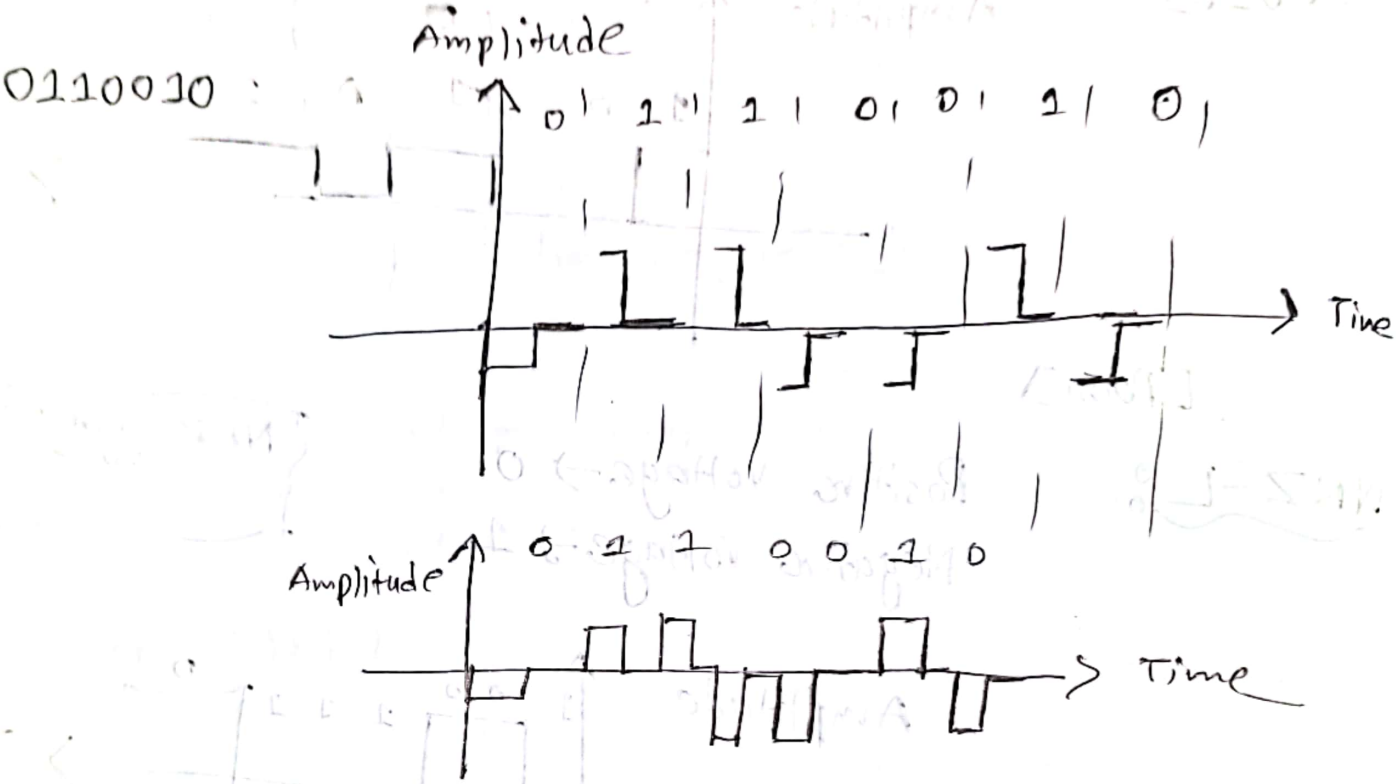
01011001

[আগেরটা 0 হলে পরেরটা একই হবে]

[1 হলে পরেরটা up/down]

RZ :
Return to Zero

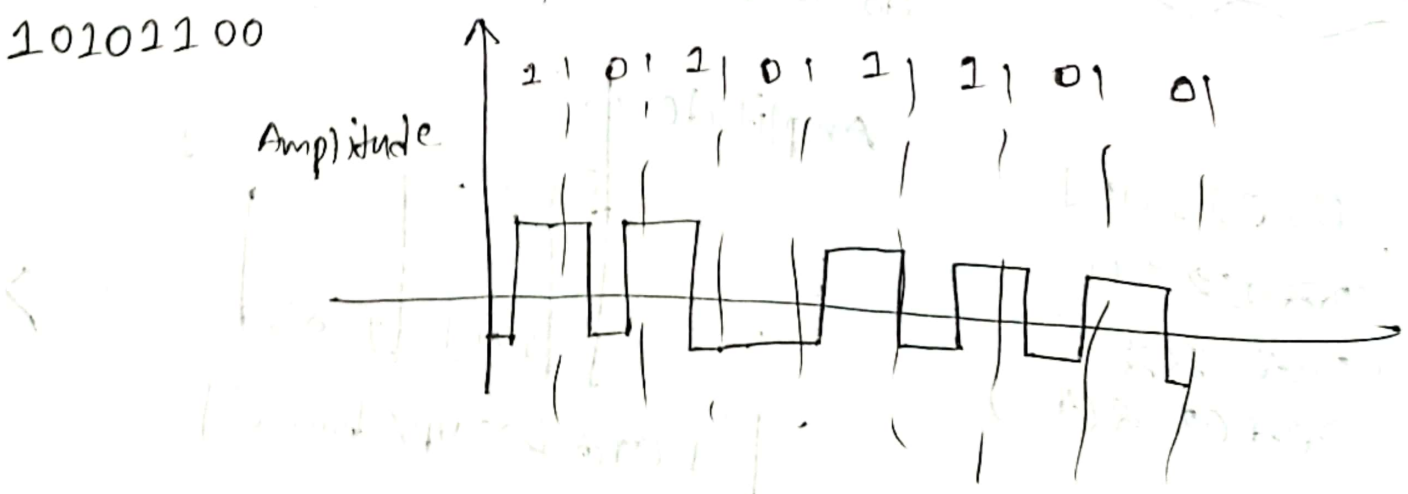
Positive to zero → 1
Negative to zero → 0



Manchester (IEEE) :

Positive to Negative → 0

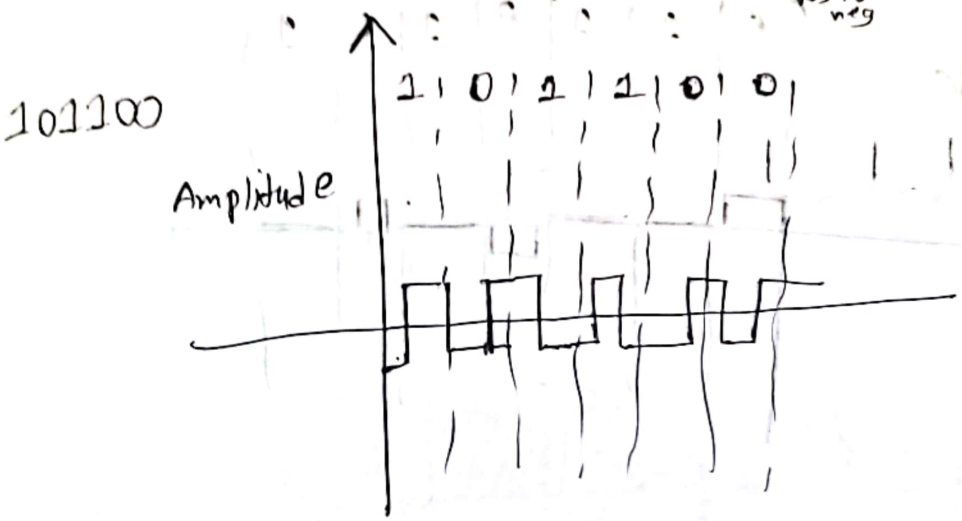
Negative to Positive → 1



Differential Manchester

Transation → 0 ⊓⊔, ⊔⊓ [বাক্স]

No Transation → 1 ⊓, ⊔ (pos to neg, neg to pos)



Bipolar Schemes

Three voltage level → (i) Pos (ii) zero (iii) neg

bit → (i) 0 (ii) 1

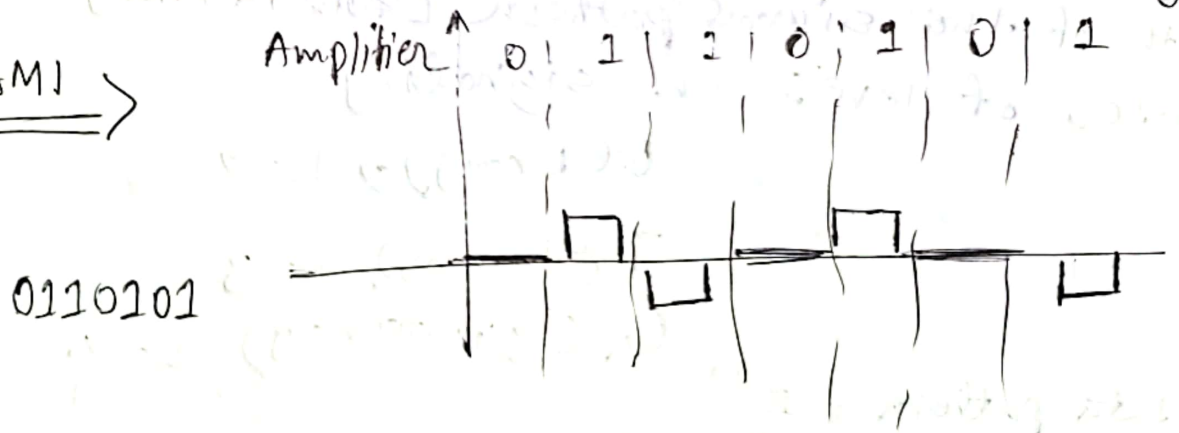
(i) AMI (Alternate Mark Inversion)

(ii) Pseudoternary

1 → Alternet

0 → zero voltage level

AMI ⟹



Pseudoternary >

1 → zero voltage level

0 → alternet

0110101

Multilevel (2B1Q)

mBnL

m = length of the binary pattern

B = Binary data

n = length of the signal pattern [কতটি সিগনাল]

L = number of levels in signaling

B (Binary) → L = 2

T (ternary), L = 3

Q (quaternary), L = 4

no. of data pattern = 2^m

$= 2^2 = 4$ (2B1Q)

L replace with Q

no. of signal patter = L^n

$= Q^n$

$= 4^1$

$\therefore = 4$

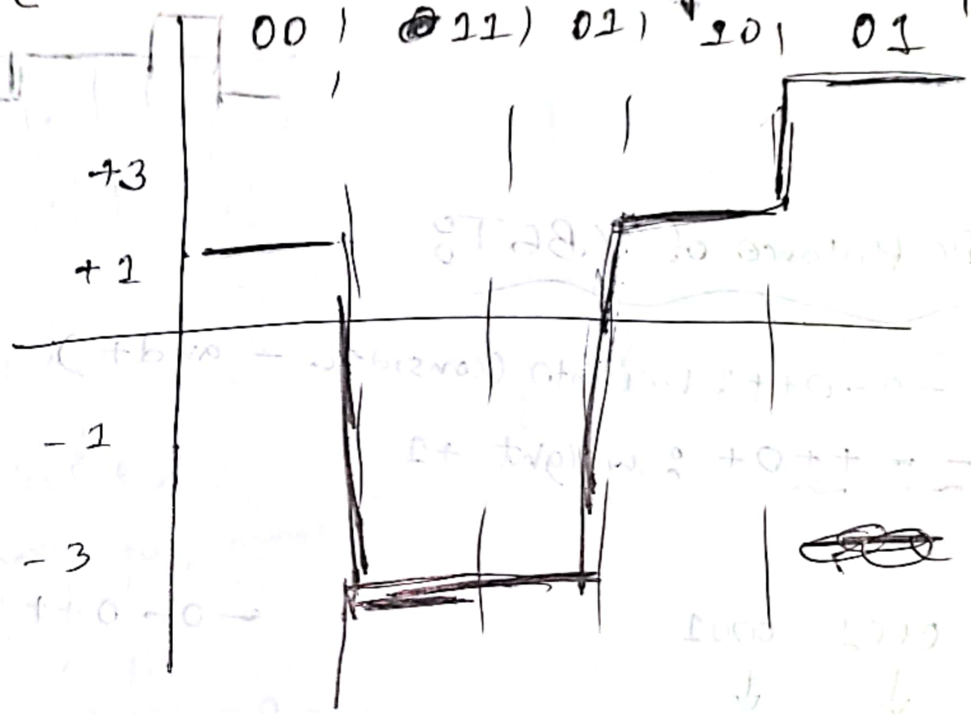
[মুখস্থ করে রাখবে] →

2B1Q	Prev. level Pos.	Prev. level Neg.
Next bit	Next level	Next level
00	+1	−1
01	+3	−3
10	−1	+1
10	−3	+3

Digital Data →

00 11 01 10 01

initially prev. level = pos.



Multilevel (8B6T):

No. of data pattern = $2^m = 2^8 = 256$

" " signal " $= L^n = 3^6 = 729$

redundant = 729 − 256 = 473 → synchronization → Error detection → DC Balance

Data	Code	Data	Code
00	−+00−+	2A	+0+−0−
11	−0−0++	50	+−−+0+
0A	0−++−0	53	−+−++0

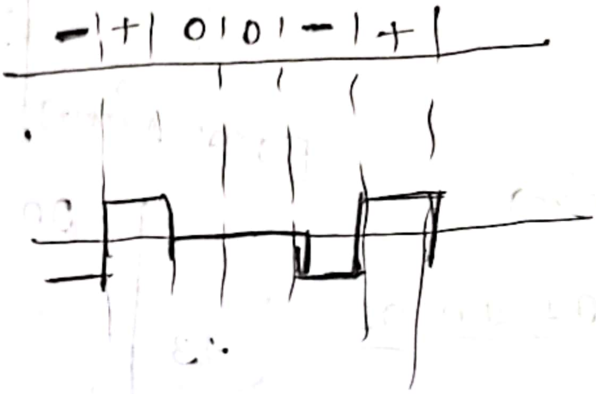
[মুখস্থ করে রাখবে] ←

Digital Data → 00010001 0101 0011 01010000

0A

↓ ↓ 10 (hexa)

0000 1010



DC Balance of 8B6T:

- 0 - 0 + + : weight 0 (consider - and +)

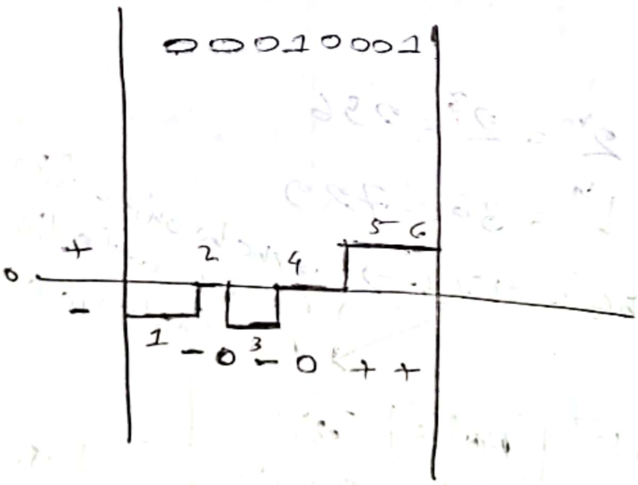
- - + + 0 + : weight +1

0001 0001

↓ ↓

1 1 in hexa

- 0 - 0 + + : weight 0

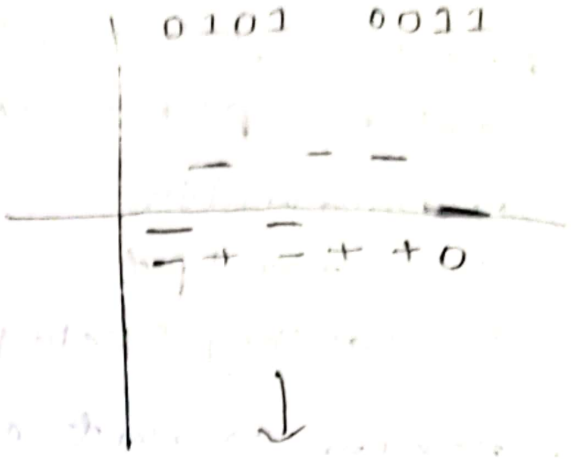


0101 0011

5 3

− + − + + 0 ; +1 (weight)

[এখানে +1 হলে as it is
এবার হলে invert করতে হবে]



0101 0000

5 0

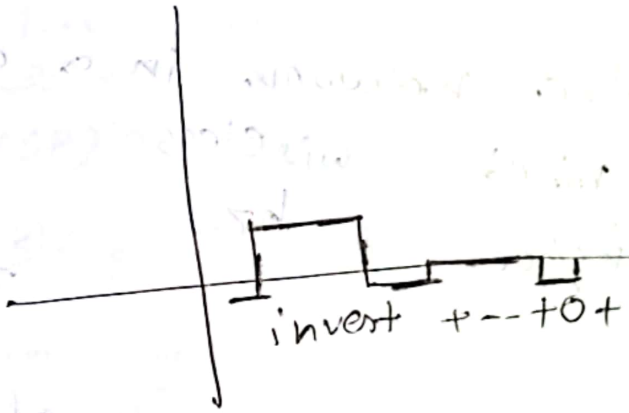
+ − − + 0 + ; weight +1

(+2) হয়ে যাচ্ছে!!! need to invert

invert

+ − − + 0 + ; ⟶ − + + − 0 −

weight (new)
−1



weight list:

0
+1
−1

overall: 0 [DC Balanced]

Bandwidth

Data transport highest rate.

Network performance is measured by -

(i) Bandwidth
(ii) Throughput
(iii) Latency (Delay)

maximum amount of data that can be transmitted per sec.

[The bandwidth of a network is given by the number of bits that can be transmitted over the network in a certain period of time]

wired wireless
hz
bits/sec

Throughput

Actual amount of data that passes through the medium.

[The throughput is a measure of how fast we can actually send data through a network]

Latency

The latency delay defines how long it takes for an entire message to completely arrive at the destination from the time the first bit is sent out from the source.

Transmission D + Propagation D + Queueing D + Processing D