Speech signal

300 Hz 3400 Hz Max freq

Nyquist criteria

2 x Max freq

6800

For Accurate Sampling 2.2 x Max freq

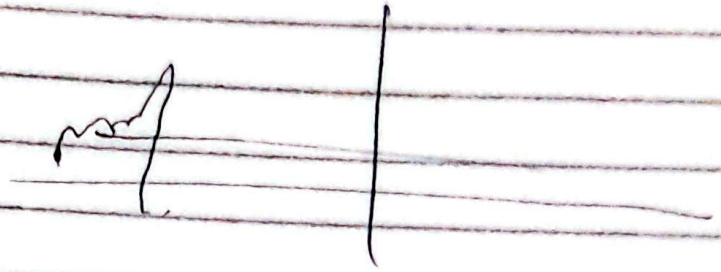
↓

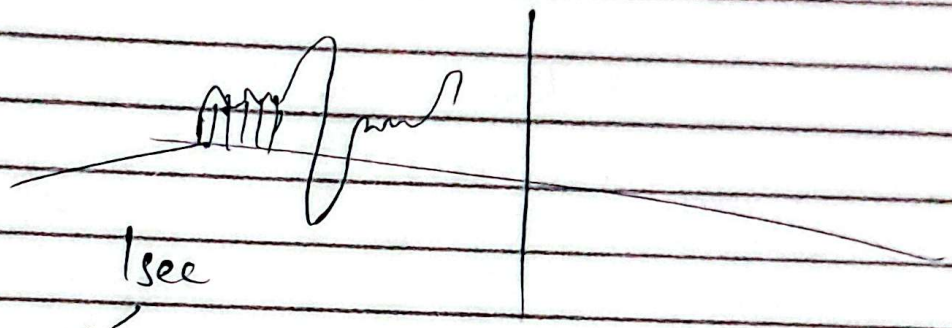
7480

PTCL 8000 s/sec

ECG Max freq → 30 Hz

Sampling rate 2.2 x 30 = 66





1 sec

30 x 2·2
Max ⇒ 70 samples

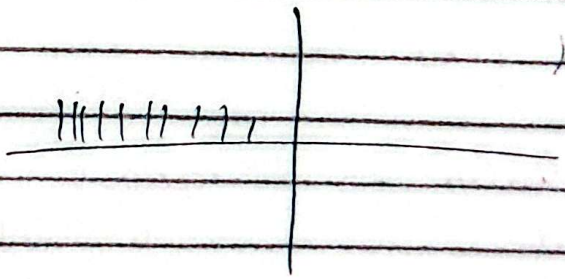
snapshots

digitized

signal

DSP

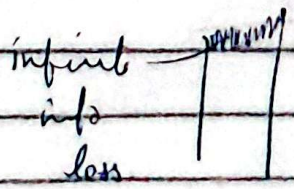
info loss
in it



No info
loss

reconstruction

If sampling rate is 2.2 times into Max than you can recover this loss



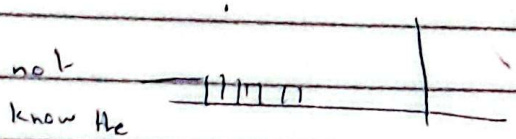
Quantization

BCI

Analogue signal

3.7

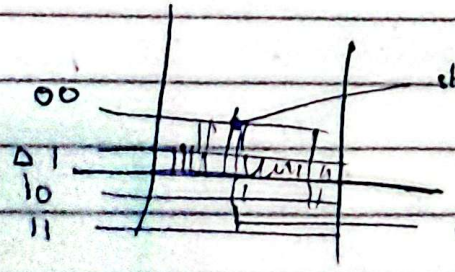
sampler



digitize on y-axis i.e.

2bit digitization → represent any sample in 2bit

2bit resolution

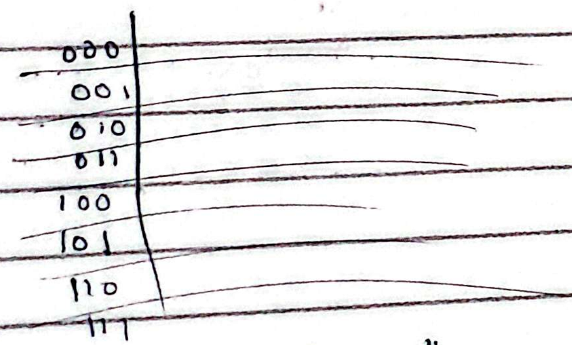


More info loss in this

for less loss increase resolution

3 bit resolution

$2^3 = 8$



why we are doing this

if we digitize signal

we can improve performance of processor

infinite values are the problem

techniques of reconstruction

increase samples

2.2x

70

100

(proven)

~~std~~ more nearer

data get increased

problem too

pulse signal

→ straight length

↓

average

Gnomes

sciences   Motor unit

Linear quantization

Sampling

2^4 → 16 linear lines

2^{24} for brain reference

Arduino → 10 bit resolution

① Quantization

brain signal

16 million quantizer

24 bit resolution

needed for brain signal

br.

Question

Multiplexing

tasks

Sampling

10 bit quantization

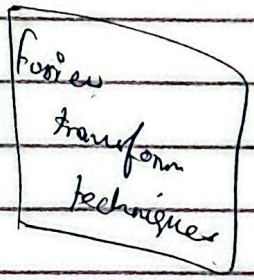
Data rate

Fourier series transform

binary encoding

non linear quantization.

Max and Min frequency →



signal →

Spectrum analyzer

↓

sine spectrum

X-axis → frequency.

Notch filter

90 MHz