SIGNALS AND SYSTEMS

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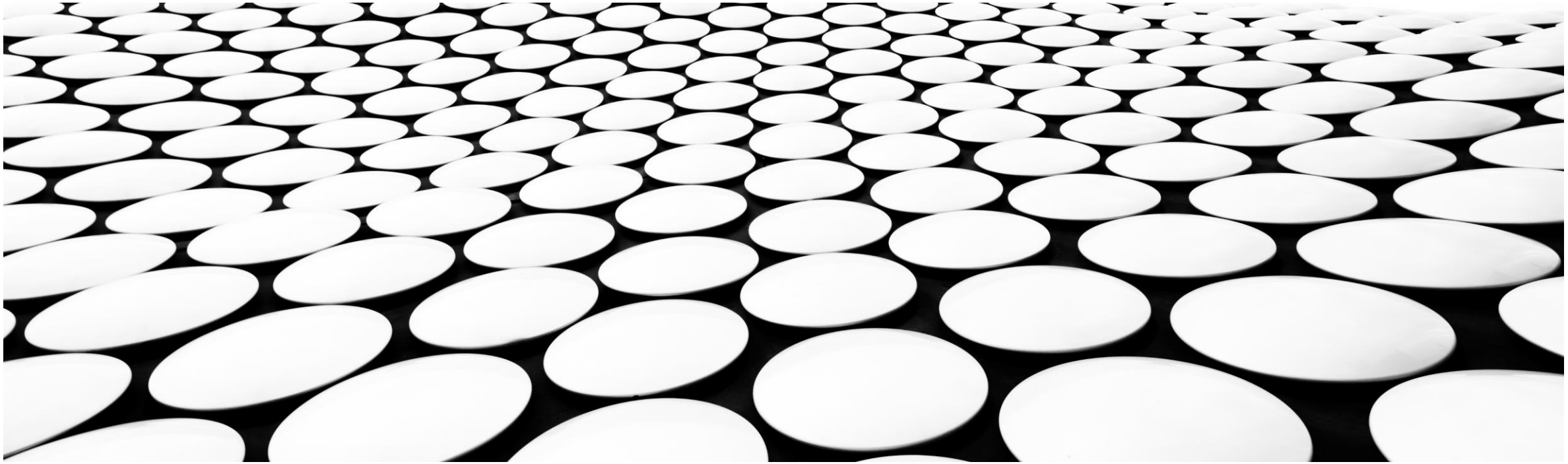


1) Signals and systems → Maths

2) Semiconductor device

3) Digital circuits → Background

4) Network theory

5) Maths

Low pass filter → high freq. signal

High pass filter

Energy → frequency

$E = h\nu$

Voice signal → low freq. signals

Voice signal → Mobile phone → Rx

Tx

Rx end → Noise → high freq.

↓

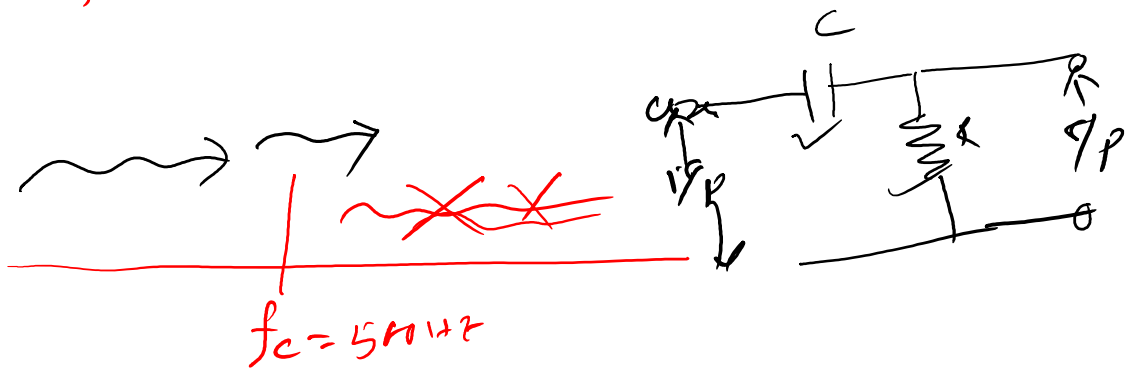
unwanted signal present in the msg (voice)

LPF → low freq. signals and cut offs all higher freq.

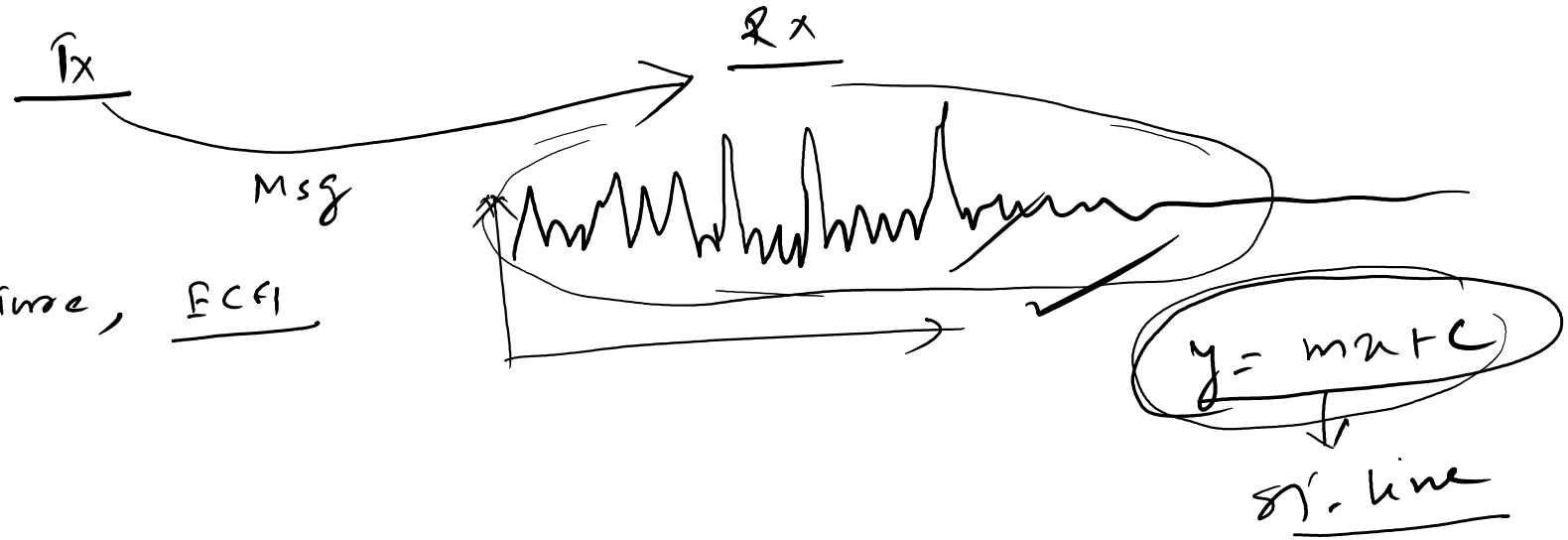
It allows

20Hz → 20kHz

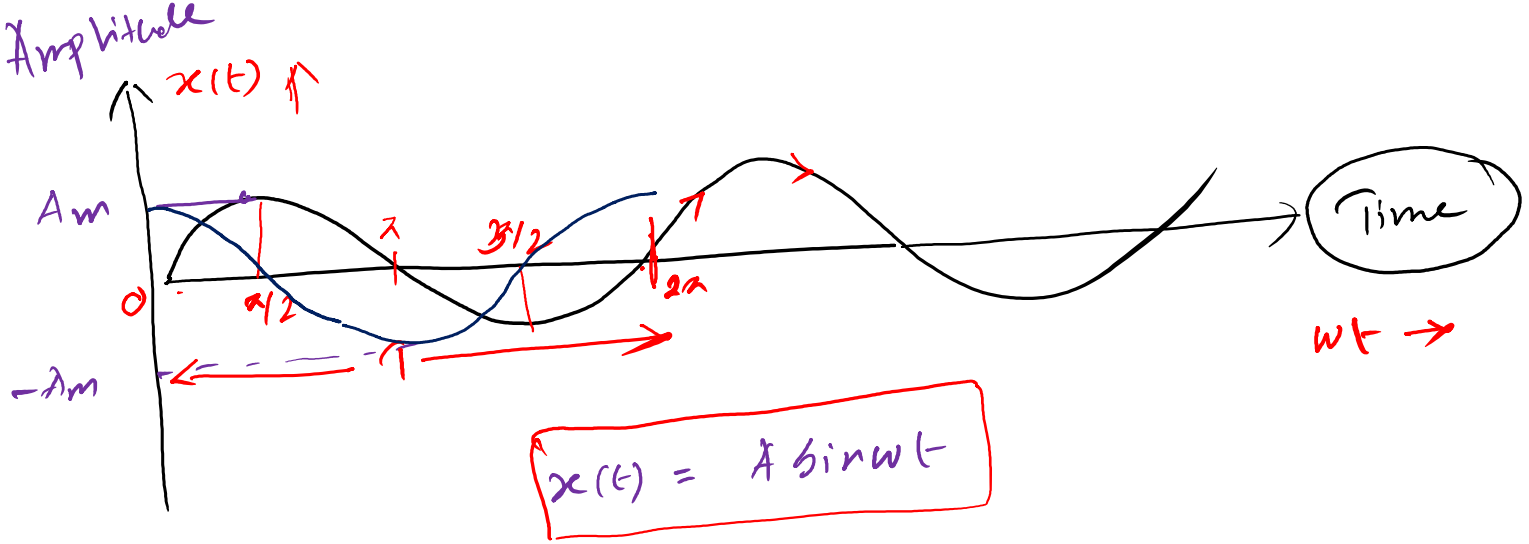
5000Hz



Signal :- physical phenomena → carry → some information



VDO, Music, picture, ECG



$x(t) = A \sin \omega t$

$T = 2\pi$

$T = 2\pi$

$=$

$y = mx + c$

$y = mx$

Depend. vari.

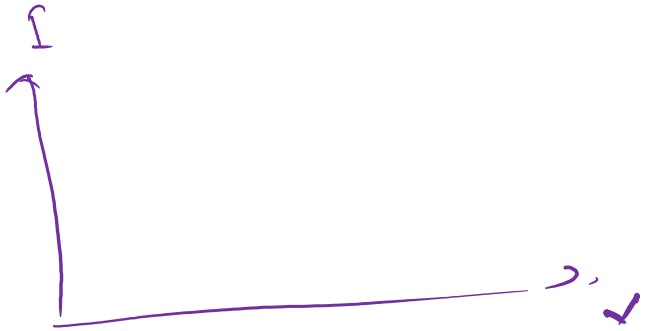
Ind. var.

Slope $m = \tan\theta = \frac{y}{x}$

$V = IR \Rightarrow V = RI$

V vs I

I vs V



$V = IR$

$\Rightarrow I = \frac{1}{R} V$

Classification of signals:-

Depending on sources → No of sources

- One channel signal → Mouse / Ear / Sensor
  generated by a single source
- multichannel signal
  - ECG → Dual channel
    - Eight channel ECG

Stereo

Stereo →

Depending on no. of variables:-

1) One-dim. signal , $V = IR$, $y = mx$

2) Multi. dim. signal $y = ax^2 + bx + c$ quadratic eqn

$y = ax + by + ct$ Movie

picture

↓

more pictures

↓

motion pictures ⇒ VDO

Nature of dependant variable:-

1) Analog → Nature or continuous

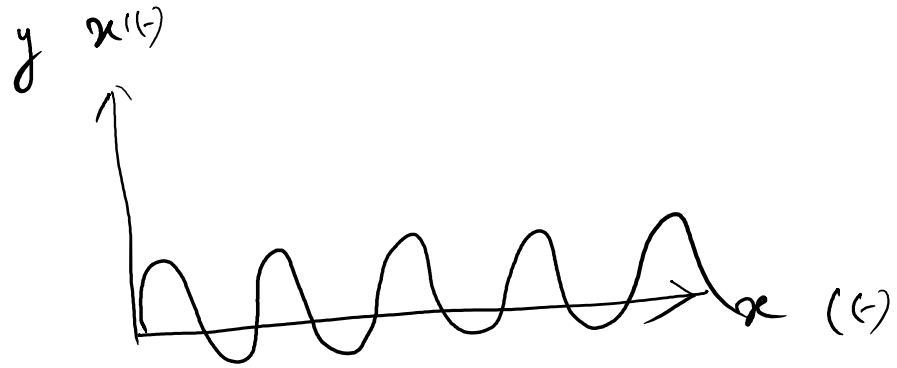
2) Discrete

Analog → discrete → digitized → Tx

Oral → Common → broadcasting

$S = V t$

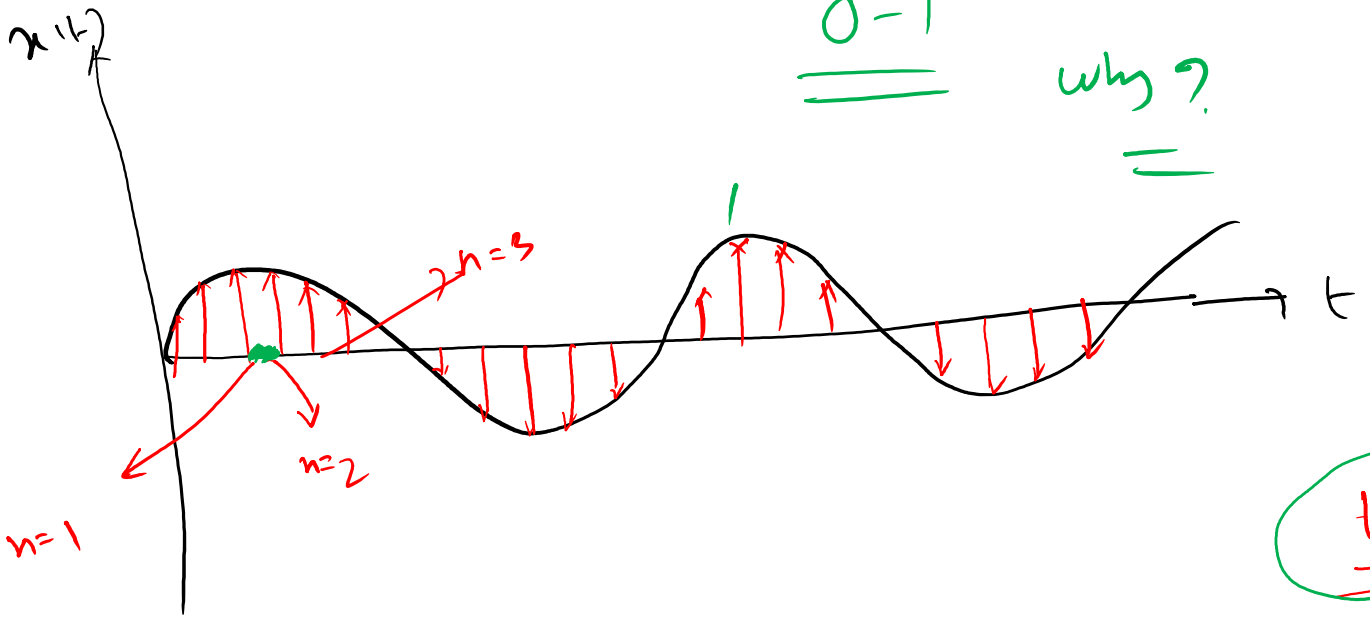
$\Rightarrow t = \frac{S}{V}$



GHY

Analog $\xrightarrow{\text{Sampling}}$ discrete $\xrightarrow{\text{Quantization}}$ digital

Set top box



0 - 1

why ?

$t = nT$

$n = 0 \quad t = 0$

$n = 1 \quad t = T$

$n = 1$ and $n = 2$

why .