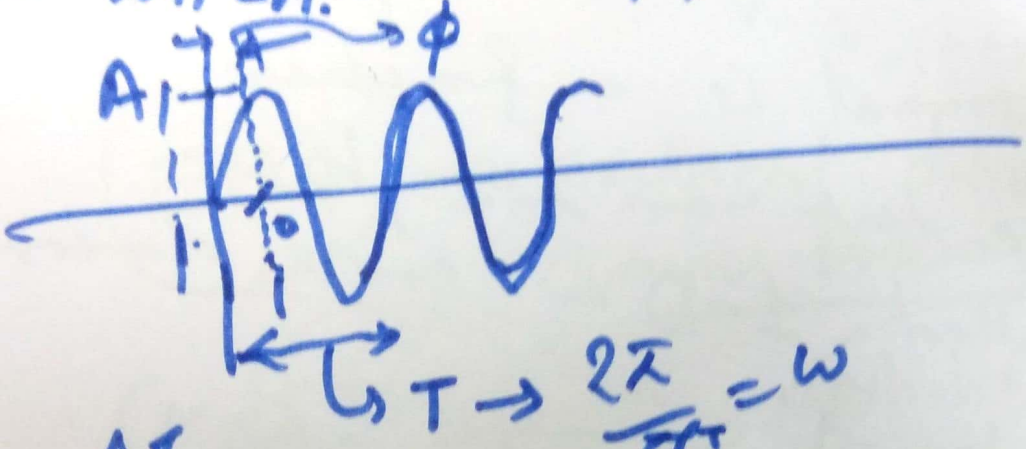
Classification of Signals:

Lecture-2

1) Continuous-time vs. Discrete-time Signals: →

(CT) $x(t) = A \sin(\omega t + \phi)$



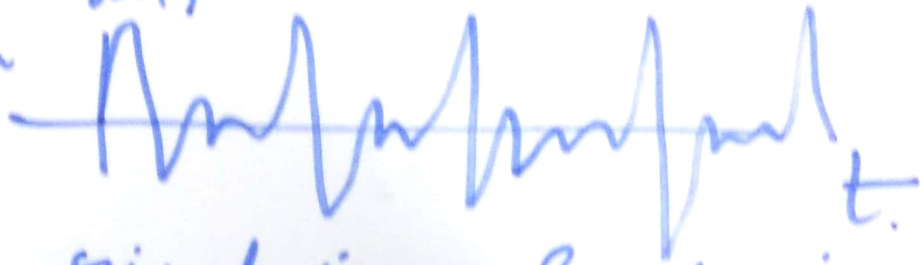
CT

(DT) Signal: → Defined for ~~each and~~ every instant of time.

$x(t)|_{t=nT} = x(nT) \Rightarrow x(nT)$ defined at discrete instants of time.

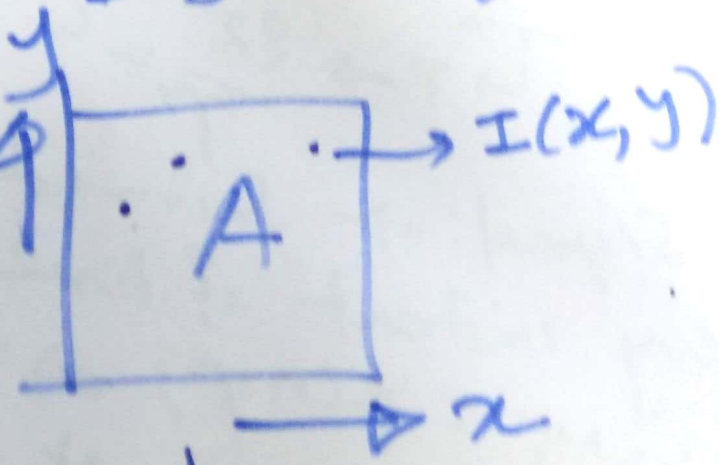
2) 1-D (single-dimensional)
vs. multidimensional

→ Speech



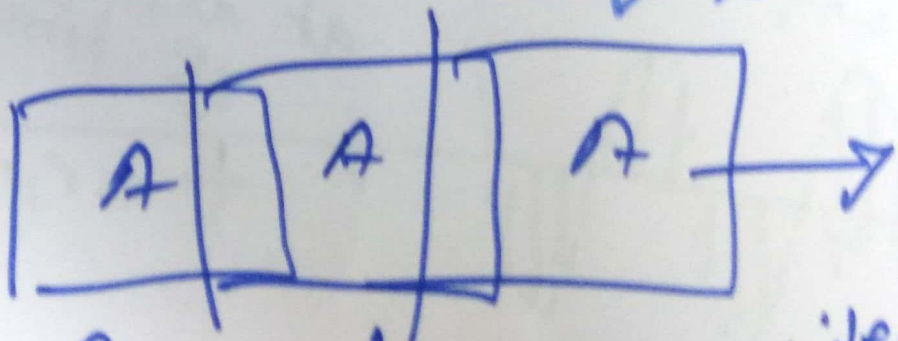
If a signal is a function of 1 independent variable, then it is called 1-D or single dimensional.

→ Image



2-D

Video



Number of frames/second → video signal.

3) Single channel vs. multichannel signal :→

Mono

→ Stereo → Left
→ Right

2-channel

EEG → Electrical activity in Human Brain

Multichannel signal

Provide Frequency Phase Amplitude signal

4) Deterministic vs. Random signal

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

$\{A, \omega, \phi\}$ → phase

Amplitude. → Frequency

$x(t)$

0 t

$x_1(t)$ $x_2(t)$ $x_3(t)$ $x_n(t)$

There is NO exact science / mathem
models that can model true speech
production mechanism.

Human speech → mobile.
↓
Record via sensor
↓
Microphone.

Siri (iOS)

Google, Microsoft, Amazon, - - - .

Google Assistant

Geometrical Representation

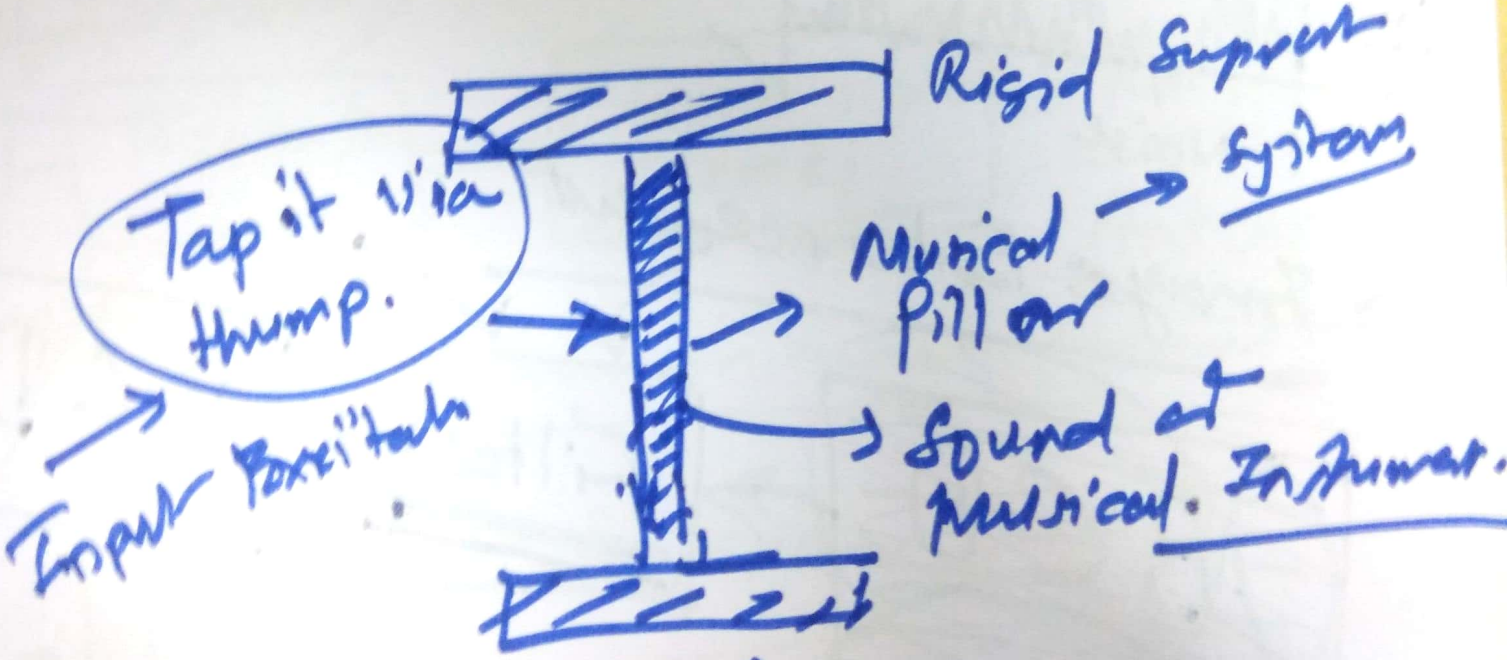
World Heritage Site

Hampi → Vithhala Temple

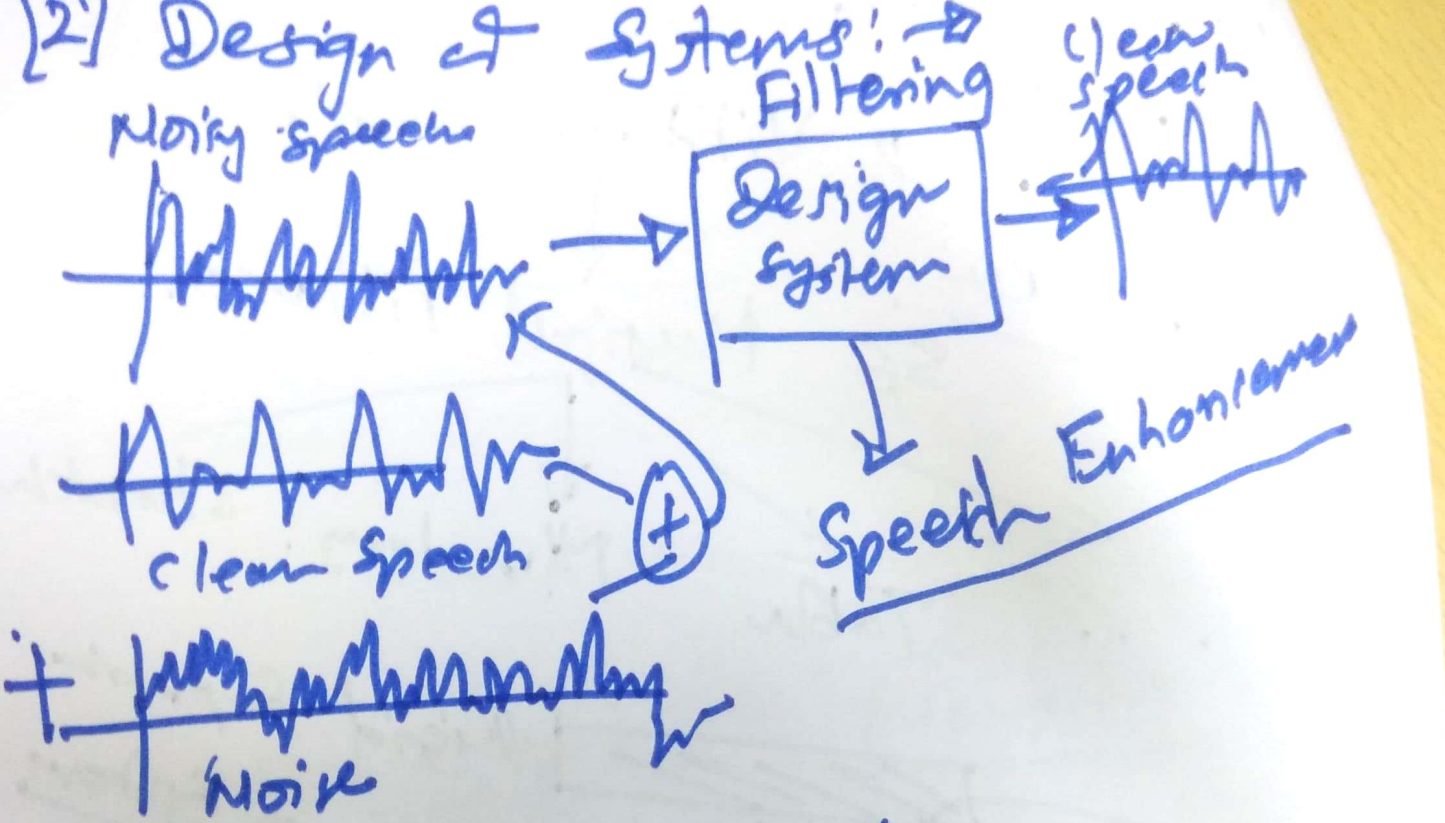
Karnataka

56 Musical Pillars.

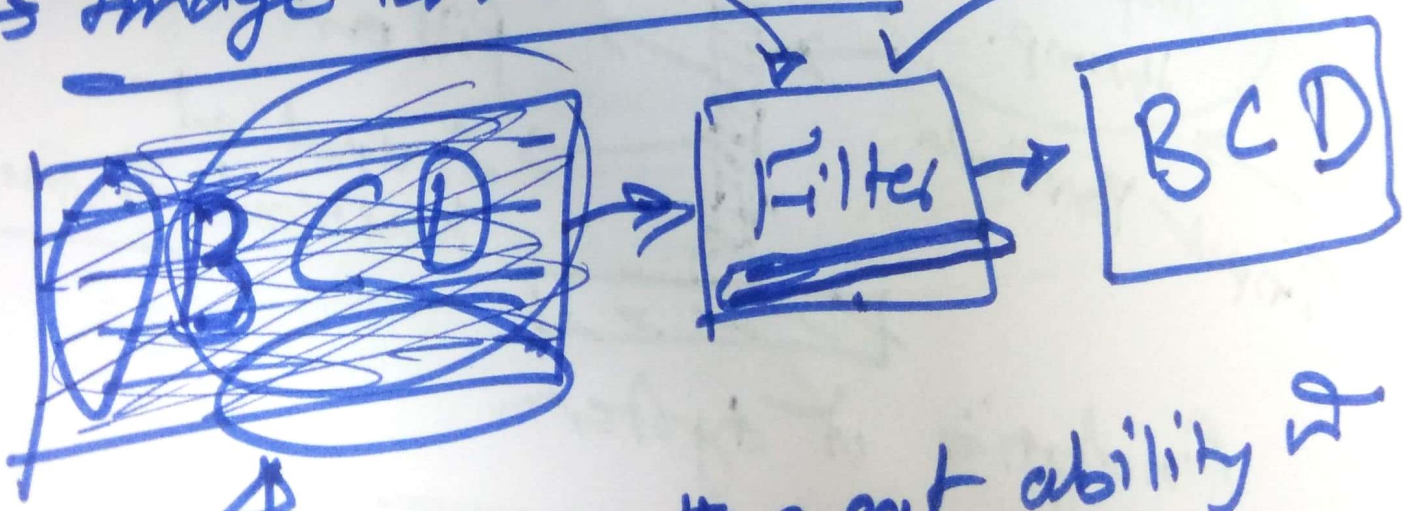
... Tabla Mridang. Shanku



[2] Design of Systems: → Altering



→ Image Enhancement



Humans have great ability of selective attention

Design of signals: → 5th sem

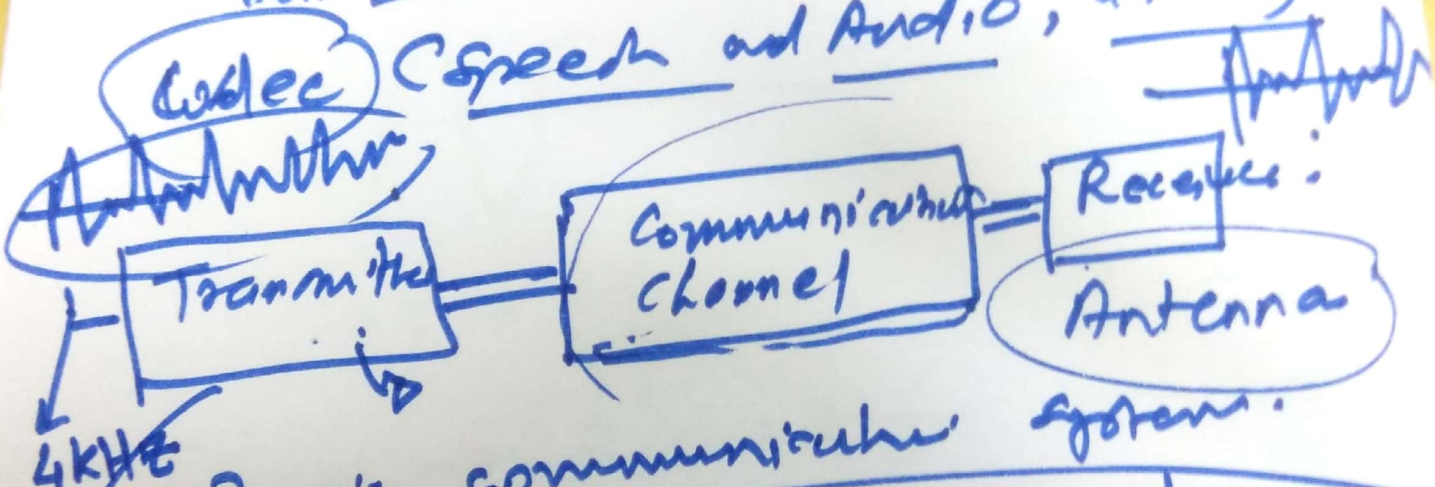
Analog and Digital Communication & Transmission Line.

→ Analog Communication & Transmission Line.

↓

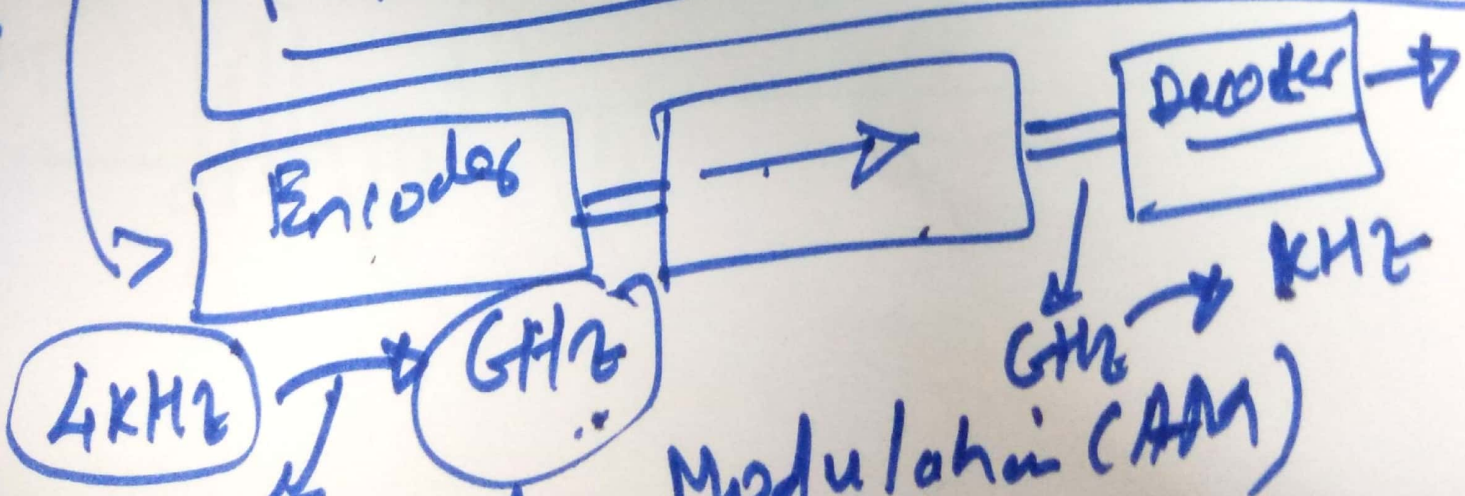
5th sem IV.

Codec (Speech and Audio, Video)



Basic communication system.

↑ Size of Antenna ∝ ↓ Bandwidth

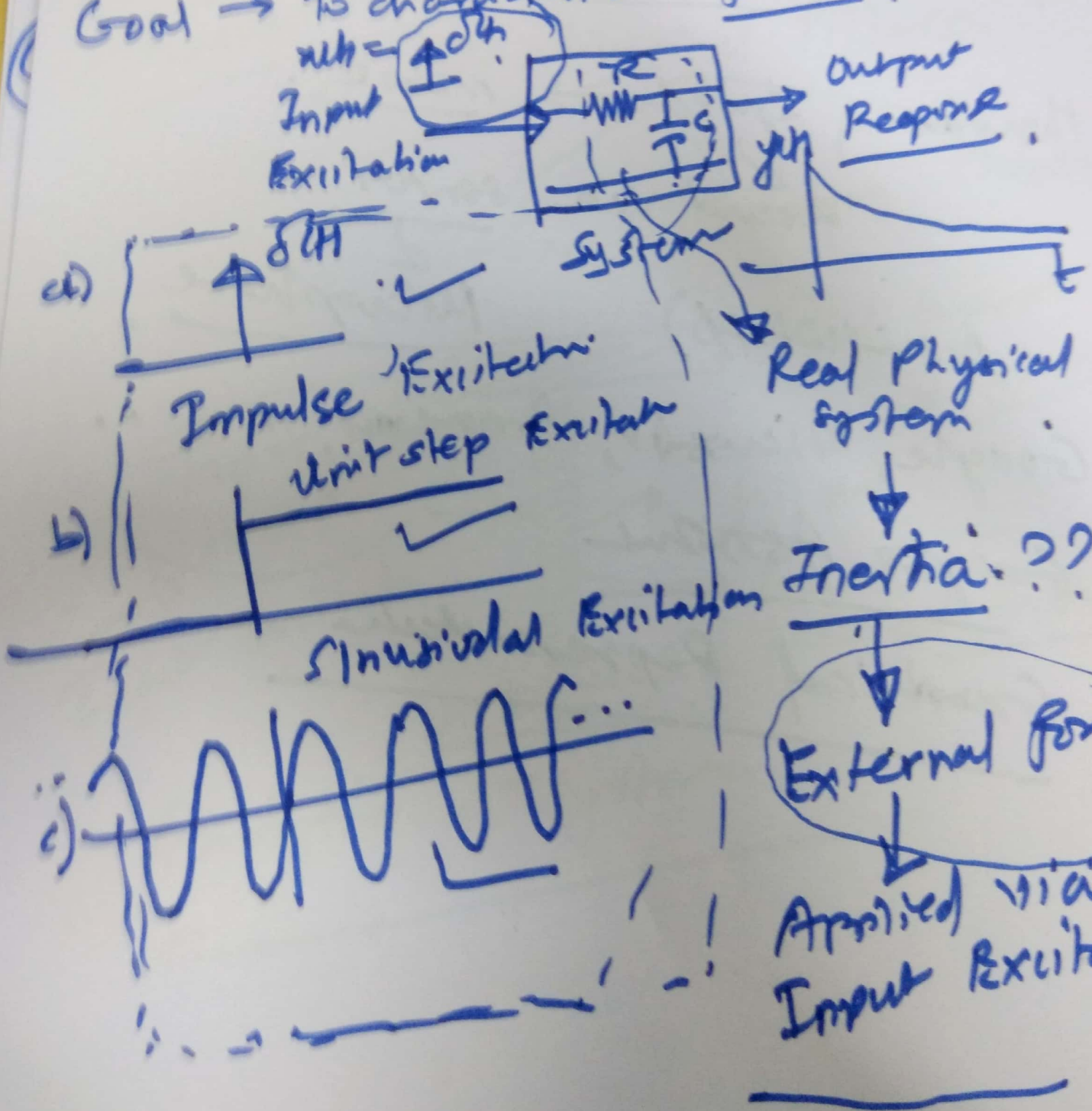


Amplitude Modulation (AM)

Distinct Problems in SAS: ☆

① Analysis of systems.

Goal → To characterize system.



A A A A A A A (unique)

Behavioral pattern

Representation of Signals :→

1) Functional Representation

↳ $x(t) = A\sin(\omega t + \phi)$

2) Graphical Representation

Speech → No fixed mathematical expression

↓

Sensor → Microphone → 1-D / 2-D / 3-D