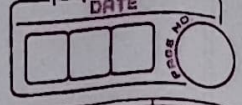
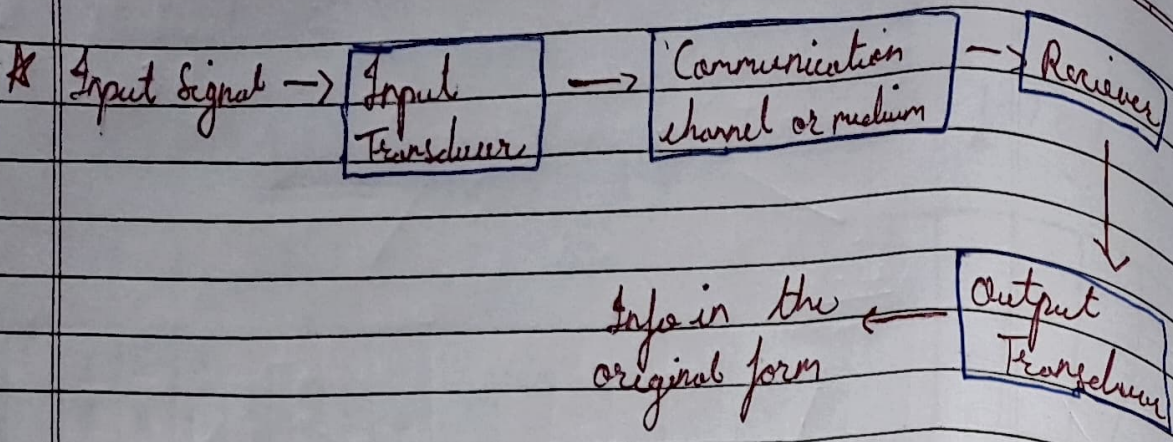
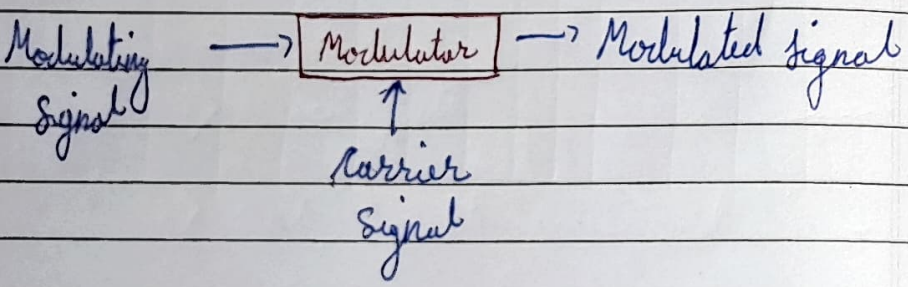




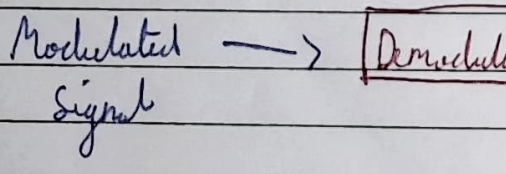
Block Diagram of basic communication system

Modulation is a process where 2 signals are used namely modulating signal and carrier.

It is defined as process in which some parameters of carrier wave (such as amplitude, frequency of phase) is varied in proportion with the instantaneous magnitude of modulating signal.



The reciever demodulates and it is opposite of modulation



☆ Multiplexing

It is process of combining several message signals together and send them over the same communication channel.

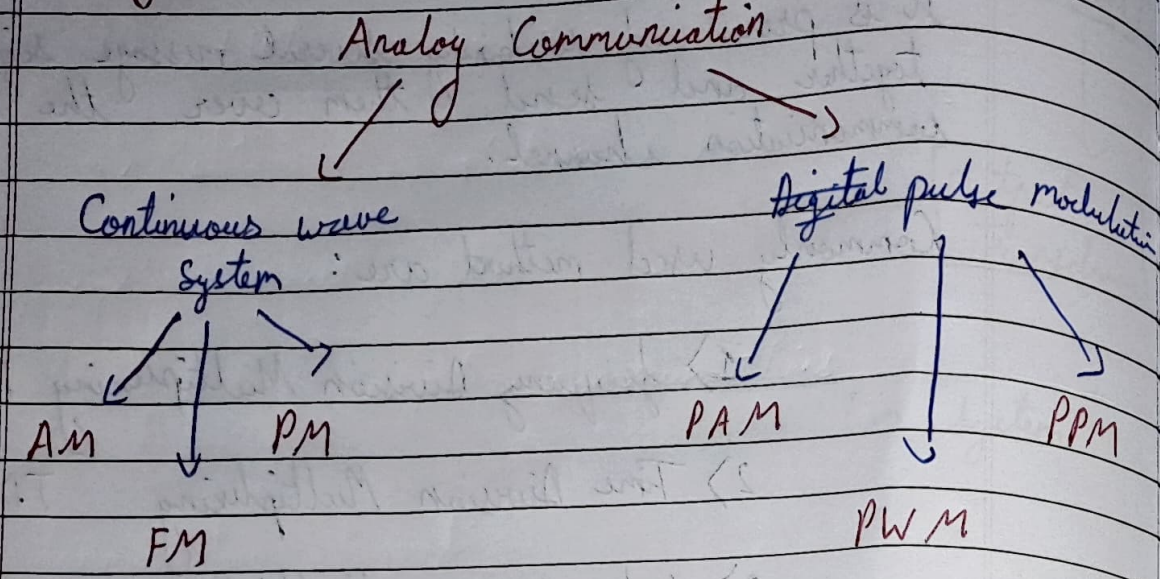
Commonly used method are:

1) Frequency Division Multiplexing FDM
2) Time Division Multiplexing TDM
3) Code Division Multiplexing CDM

☆ Need of Modulation

i) Reduction in height of antenna
ii) Avoids mixing of signals
iii) Increase range of communication
iv) Multiplexing becomes possible
v) Improves quality of reception

Analog



Advantages:

i) Transmitter and Reciever are simple

ii) low bandwidth requirement

iii) frequency division multiplexing can be used.

Disadvantages:

i) Noise affects

ii) can't seperate noise and signal

iii) ~~Rpet~~ Repeaters cant be used.

iv) Coding not possible

v) Not secure

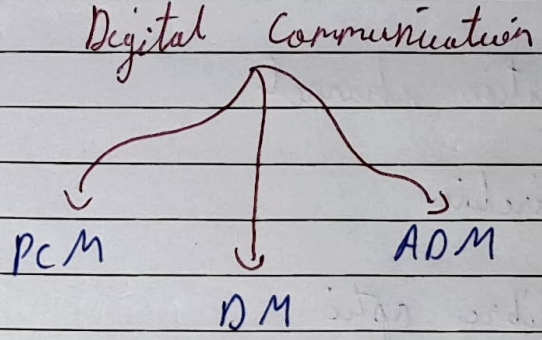
Applications :

i) Radio broadcasting (AM and FM)

ii) TV broadcasting

iii) Telephones

* Digital



Advantages :

i) less noise

ii) possible to detect and correct ~~data~~ errors

iii) Repeaters can be used

iv) Time division multiplexing can be used

v) More secure

vi) Simpler and cheaper

Disadvantages :

i) bit rate high

ii) Require large channel

iii) needs synchronization

Applications :

i) Satellite communication

ii) Military communication which needs coding

iii) Telephone System

iv) Data & Computer communications

* Communication channel

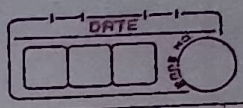
i) Wireless

ii) fibre optic

iii) Wireless electromagnetic channels

iv) Underwater Acoustic channels

v) Storage channel



Digital source → Source encoder → channel encoder → Modulator → Communication channel ← Noise

Communication channel → Demodulator → channel decoder → Source decoder → Destination

Digital Communication System

Table 1.12.1

Sr. No.	Characteristics/Parameter	Analog Communication systems	Digital Communication systems
1.	Nature of transmitted signal.	Analog signal	Digital signal
2.	Information content in transmitted message.	Variation in amplitude, frequency or phase contains information.	The transmitted code words contain the information.
3.	Example systems.	AM, FM, PM, PAM, PWM, etc.	PCM, DM, ADM, DPCM, etc.
4.	Use of repeaters.	Not possible	Possible
5.	Noise immunity	Poor	Very good
6.	Bandwidth requirement	Low as compared to digital communication.	High due to higher bit rates.
7.	Type of multiplexing	FDM	TDM
8.	Complexity	Complex and difficult to build.	Simple and less complex
9.	Cost	Low	High in the earlier days but now costs have reduced.
10.	Robustness of components and subsystems.	Low	Very high.
11.	Storage and retrieval.	Not possible	Easily possible to store and retrieve voice, data and video information.
12.	Flexibility	Low	High
13.	Long distance communication.	Restricted	Possible because repeaters can be used.
14.	Coding	Not possible	Possible
15.	Secrecy of communication.	Not possible	Possible due to coding and encryption techniques.