SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore-35

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade(III Cycle)
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECB301-ANALOG AND DIGITAL COMMUNICATION

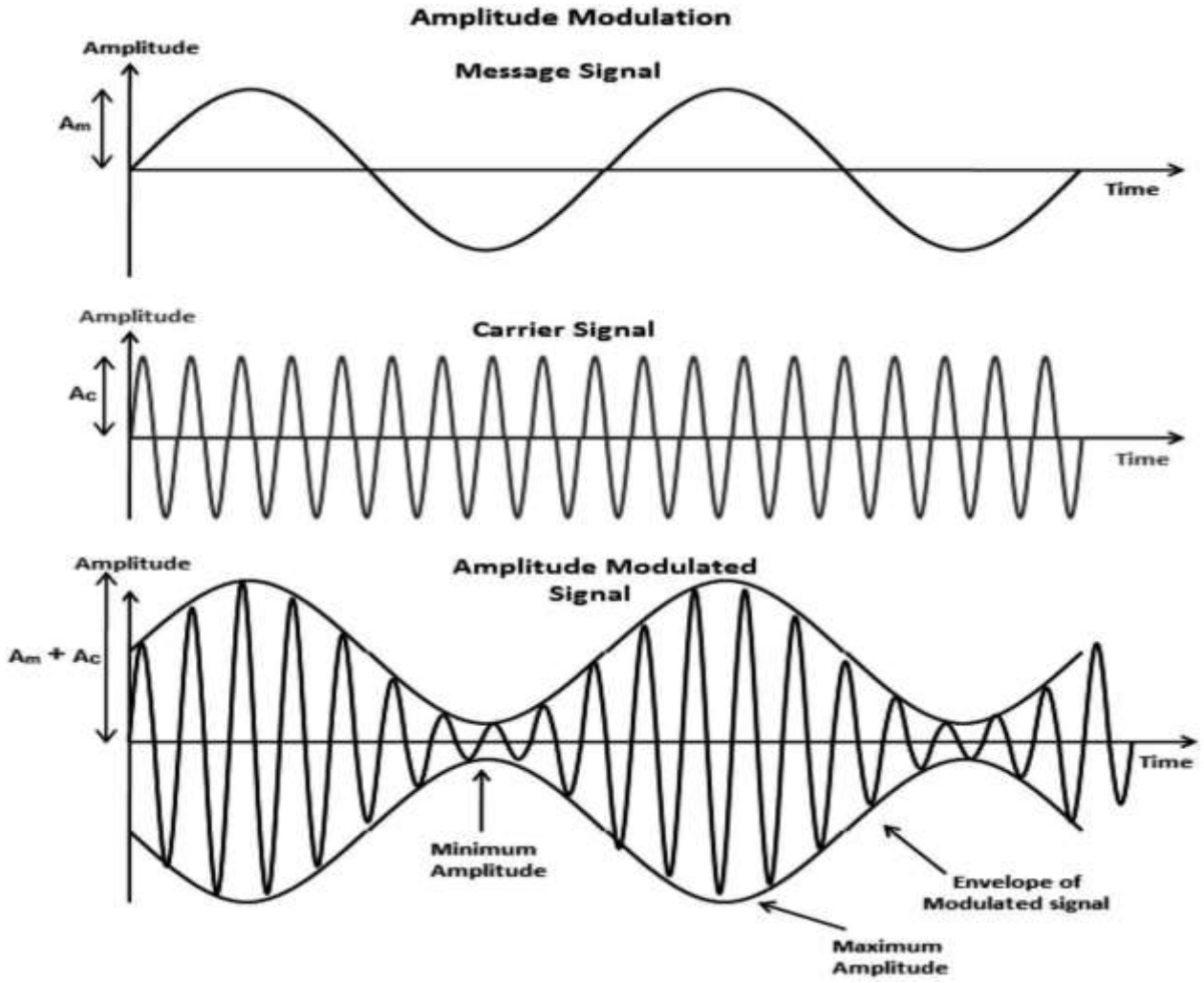
III YEAR/ V SEMESTER

UNIT 1 – ANALOG COMMUNICATION

TOPIC – COMPARISON OF VARIOUS ANALOG COMMUNICATION TECHNIQUES(AM,FM,PM)

AMPLITUDE MODULATION

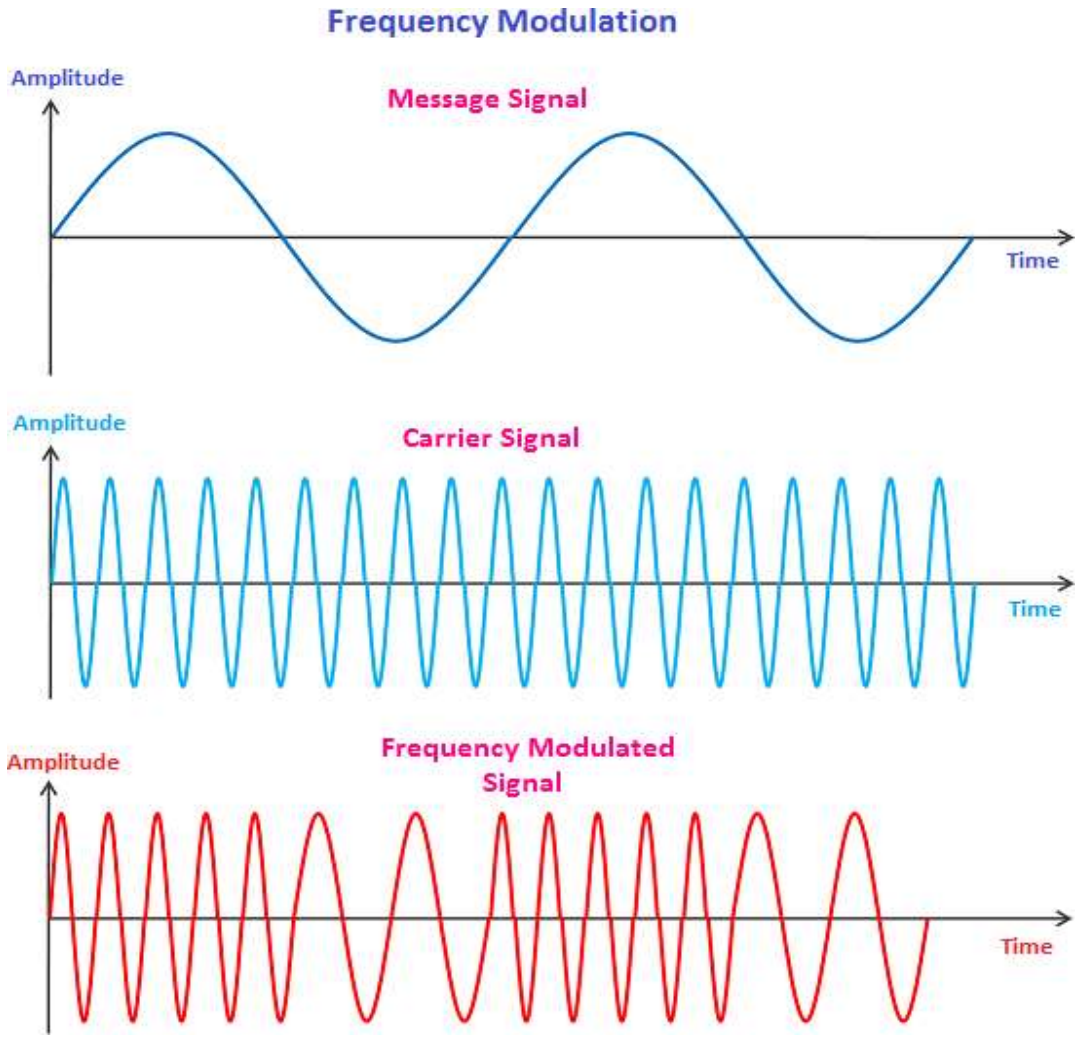
•Modulation in which the amplitude of a carrier wave is varied in accordance with some amplitude of the modulating signal.



FREQUENCY MODULATION

•Modulation in which the Frequency of a carrier wave is varied in accordance with some amplitude of the modulating signal.

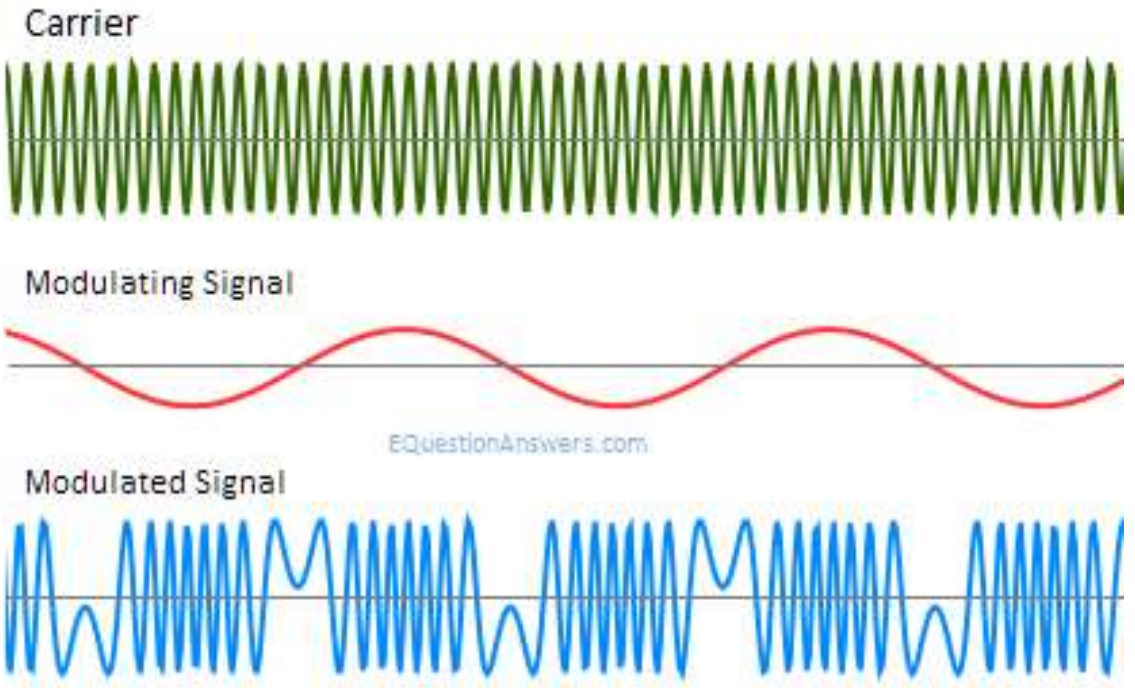
•Amplitude of Carrier Signal is constant.



PHASE MODULATION

•Modulation in which the phase of a carrier wave is varied in accordance with the amplitude of the modulating signal.

•Amplitude of Carrier Signal is constant.



Phase Modulation

Difference between AM and FM

S.No.	Parameters	AM	FM
1.	Full-form	Amplitude modulation	Frequency modulation
2.	Origin	The AM method of audio transmission was successfully carried out in the mid-1870s.	FM radio was developed in the United States in the 1930s by Edwin Armstrong.
3.	Modulating differences	In AM, a radio wave known as the "carrier" or "carrier wave" is modulated in amplitude by the signal that is to be transmitted.	In FM, a radio wave known as the "carrier" or "carrier wave" is modulated in frequency by the signal that is to be transmitted.

Difference between AM and FM

4.	Constant parameters	The frequency and phase remain the same.	The amplitude and phase remain the same.
5.	Quality	AM has poorer sound quality, and a lower bandwidth but is cheaper. It can be transmitted over long distances as it has a lower bandwidth, which is why it can hold more stations available in any frequency range.	FM is less affected by interference, but FM signals are impacted by physical barriers. They have a better sound quality due to higher bandwidth.

Difference between AM and FM

6.	Frequency range	AM radio ranges from 535 to 1700 kHz or up to 1200 bits per second.	FM radio ranges in a higher spectrum from 88.1 to 108.1MHz or up to 1200 to 2400 bits per second.
7.	Bandwidth BW	BW is much less than FM. B.W. = 2 fm	BW is large. Hence a wide channel is required. B.W. = 2 x (δ + fm)
8.	Bandwidth requirements	Bandwidth is less than FM or PM and doesn't depend upon the modulation index. The bandwidth requirement is twice the highest modulating frequency.	Bandwidth requirement is greater and depends upon the modulating. The bandwidth requirement is twice the sum of the modulating signal frequency and the frequency deviation.

Difference between AM and FM

9.	The frequency required for broadcasting	In AM radio broadcasting, if the modulating signal has a bandwidth of 15 kHz, then the bandwidth of an amplitude- The modulated signal is 30 kHz.	Let's say, if the frequency deviation is 75kHz and the modulating signal frequency is 15kHz, the bandwidth required is 180kHz.
10.	No of Sidebands	The number of sidebands is constant and equal to 2.	The number of sidebands having significant amplitude depends upon the modulation index
11.	Zero crossings in modulating signal	Equidistant	Not equidistant

Difference between AM and FM

12.	Complexity	AM transmitters and receivers are less complex than FM and PM, but synchronization is needed in the case of SSBSC carriers.	FM (or PM) transmitters are more complex than AM because the variation of modulating signal has to be converted and detected from the corresponding variation in frequencies.

Difference between AM and FM

13.	Noise	AM receivers are very less susceptible to noise because noise affects the amplitude, which is where information is stored in AM signals.	FM receivers are better immune to noise and it is possible to decrease noise by further deviation.
14.	Efficiency	Power is wasted in transmitting the carrier.	All transmitted power is useful so that's why FM is very efficient.
15.	Application	MW (Medium wave), SW (short wave) band broadcasting, video transmission in T.V.	Broadcasting FM, audio transmission on T.V.

Difference between AM, FM, and PM

S.No.	Parameters	FM	AM	PM
1.	Definition	Frequency modulation is a technique of modulation, in which the frequency of the carrier varies in accordance with the amplitude of the modulating signal. The amplitude and phase are constant.	Amplitude modulation is a technique of modulation in which the amplitude of the carrier wave varies in accordance with the amplitude of the modulating signal. The frequency and phase are constant.	Phase modulation is a technique of modulation in which the phase of the carrier wave varies in accordance with the amplitude of the modulating signal. The amplitude and frequency are constant.

Difference between AM, FM, and PM

2.	Noise	Noise immunity of FM is superior to AM and PM.	AM receivers are very susceptible to noise.	Noise immunity is better than AM but not FM.
3.	Function	The frequency of the carrier wave deviates as per the voltage of the modulating signal input.	The amplitude of a carrier wave in AN diverges as per amplitude or voltage of modulating signal input.	A phase of the carrier wave varies as per the voltage of modulating signal input.

Difference between AM, FM, and PM

Constant parameter	The amplitude of the carrier wave is kept changeless.	The frequency of the carrier wave is kept invariable.	The amplitude of the carrier wave is kept changeless.
Types	Digital FM types: FSK, GFSK, offset PSK, etc.	AM types: DSB-SC, SSB, VSB, etc.	Digital PM types: QPSK, BPSK, QAM (the combination of amplitude and phase, modulation).
Waveforms			

THANK YOU