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

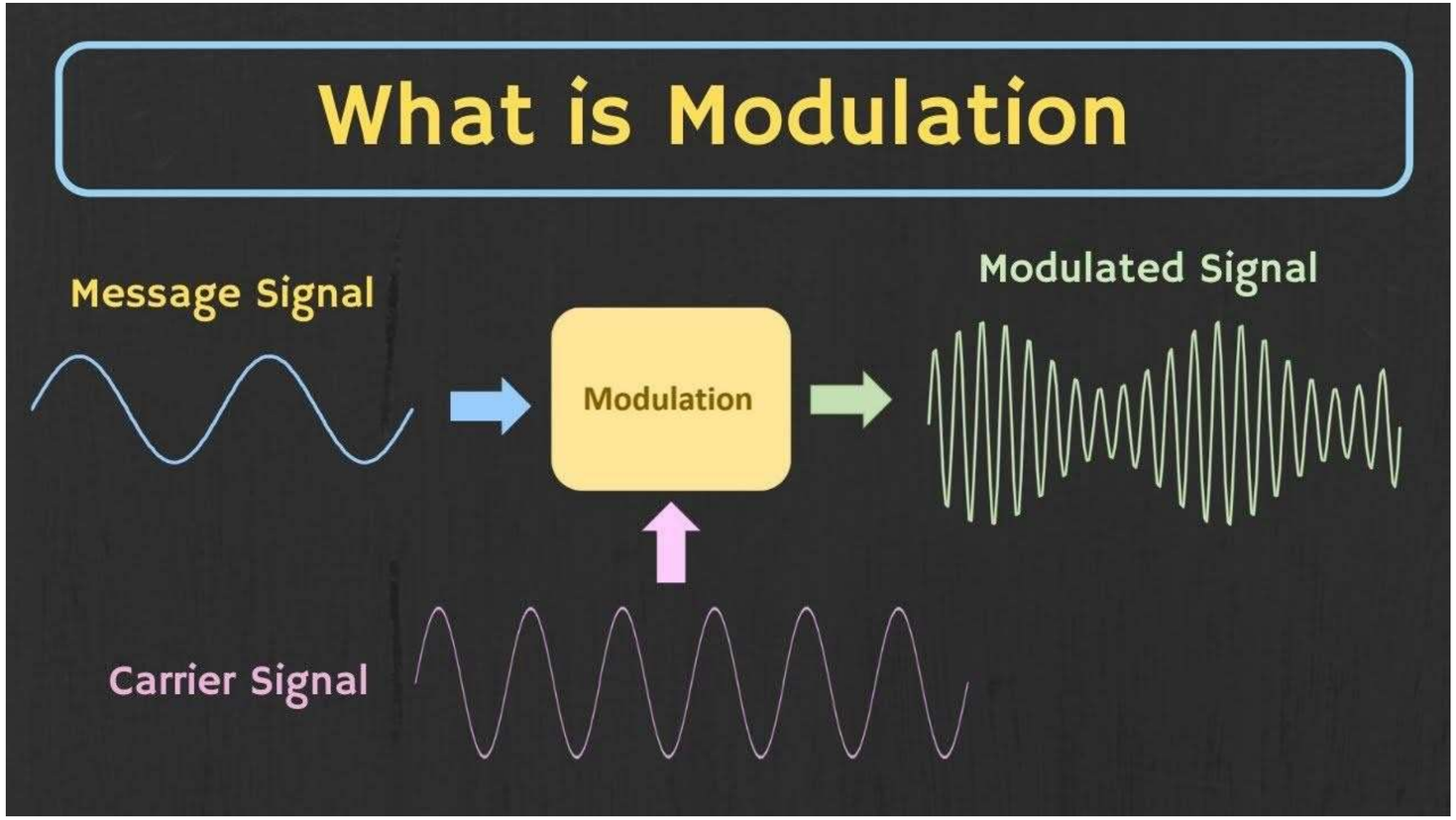
III YEAR/ V SEMESTER

UNIT 1 – ANALOG COMMUNICATION

TOPIC – MODULATION-TYPES-NEED FOR MODULATION

WHAT IS MODULATION ?

•Modulation refers to the process of changing the parameters of the carrier signal corresponding to the instantaneous values of the modulating signal.



MODULATION

•**Modulation is a** process that convert a message signal into a suitable form to transmit over a long distance through a communication channel.

•This is necessary because the message signal being a low frequency signal, that cannot be transmitted efficiently over the channel directly.

•The process of shifting the baseband signal (low frequency signal) to pass band range or high frequency is called Modulation.

• In the modulation process, some characteristic of a high-frequency carrier signal (band pass), is changed according to the instantaneous value of the information (baseband) signal.

•The process of shifting the pass band signal to baseband frequency range is called **Demodulation**.

MODULATION

Modulating Signal:

•This is the signal that contains the message to be transmitted from the sender to the receiver and is called a message signal.

•Generally, the message signals are the band of low or high frequencies and are often called baseband signals.

•The message signals are the signals to be transmitted from the sender to the receiver. The frequency of the message signals to be sent is generally low.

•Thus, these signals undergo modulation to get correctly transmitted from one location to another.

MODULATION

Carrier Signal:

• The other signal used in the process of modulation is the carrier signal that has high-frequency sinusoidal waves.

•The high-frequency carrier wave can travel much quicker as compared to the baseband signal.

•These signals have a specific frequency, amplitude, and phase, but no information.

•After modulation, carrier signals are used to transmit the signal to the receiver.

Modulated Signal: After the modulation is done, the resultant signal refers to the modulated signal. This signal is the mixture of the carrier signal and message signal.

ACTIVITY
What you infer from these pictures ??

REASON FOR MODULATION

- Practical Design of Antennas
- Simultaneous transmission of several signals i.e Multiplexing
- Suitable for signal transmission (distance…etc)
- Narrow banding

BASEBAND SIGNAL

A baseband signal refers to a transmission signal that hasn't been modulated or demodulated to its original frequency. It can be transmitted over optical fibers, coaxial cables.

NEED FOR MODULATION

- **Interaction purposes** – enables people to interact in a timely fashion on a global level in social, political, economic and scientific areas, through telephones, electronic-mail and video conference.

- **Transfer Information** – Tx in the form of audio, video, texts, computer data and picture through facsimile, telegraph or telex and internet.

- **Broadcasting** – Broadcast information to masses, through radio, television or teletext.

NEED FOR MODULATION

Increase The Signal Strength

- The baseband signals transmitted by the sender are not capable of direct transmission.
- The strength of the message signal should be increased so that it can travel longer distances. This is where modulation is essential.
- The most vital need of modulation is to enhance the strength of the signal without affecting the parameters of the carrier signal.

Wireless Communication System

- Modulation has removed the necessity for using wires in the communication systems.
- It is because modulation is widely used in transmitting signals from one location to another with faster speed.

NEED FOR MODULATION

Prevention Of Message Signal From Mixing

•Modulation and its types prevent the interference of the message signal from other signals.

•It is because a person sending a message signal through the phone cannot tell such signals apart. As a result, they will interfere with each other.

•However, by using carrier signals having a high frequency, the mixing of the signals can be prevented.

Size Of The Antenna

•The signals within 20 Hz to 20 kHz frequency range can travel only a few distances.

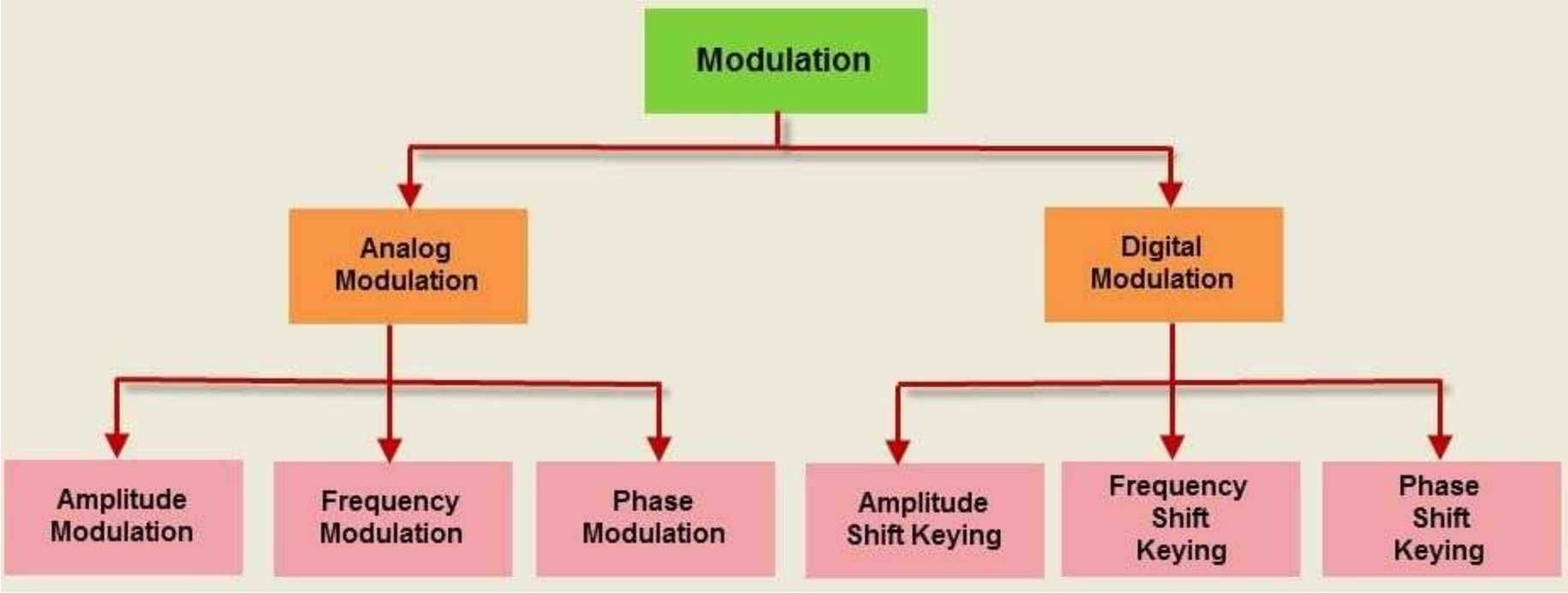
•To send the message signal, the length of the antenna should be a quarter wavelength of the used frequency.

•Thus, modulation is required to increase the frequency of the message signal and to enhance its strength to reach the receiver.

NEED FOR MODULATION

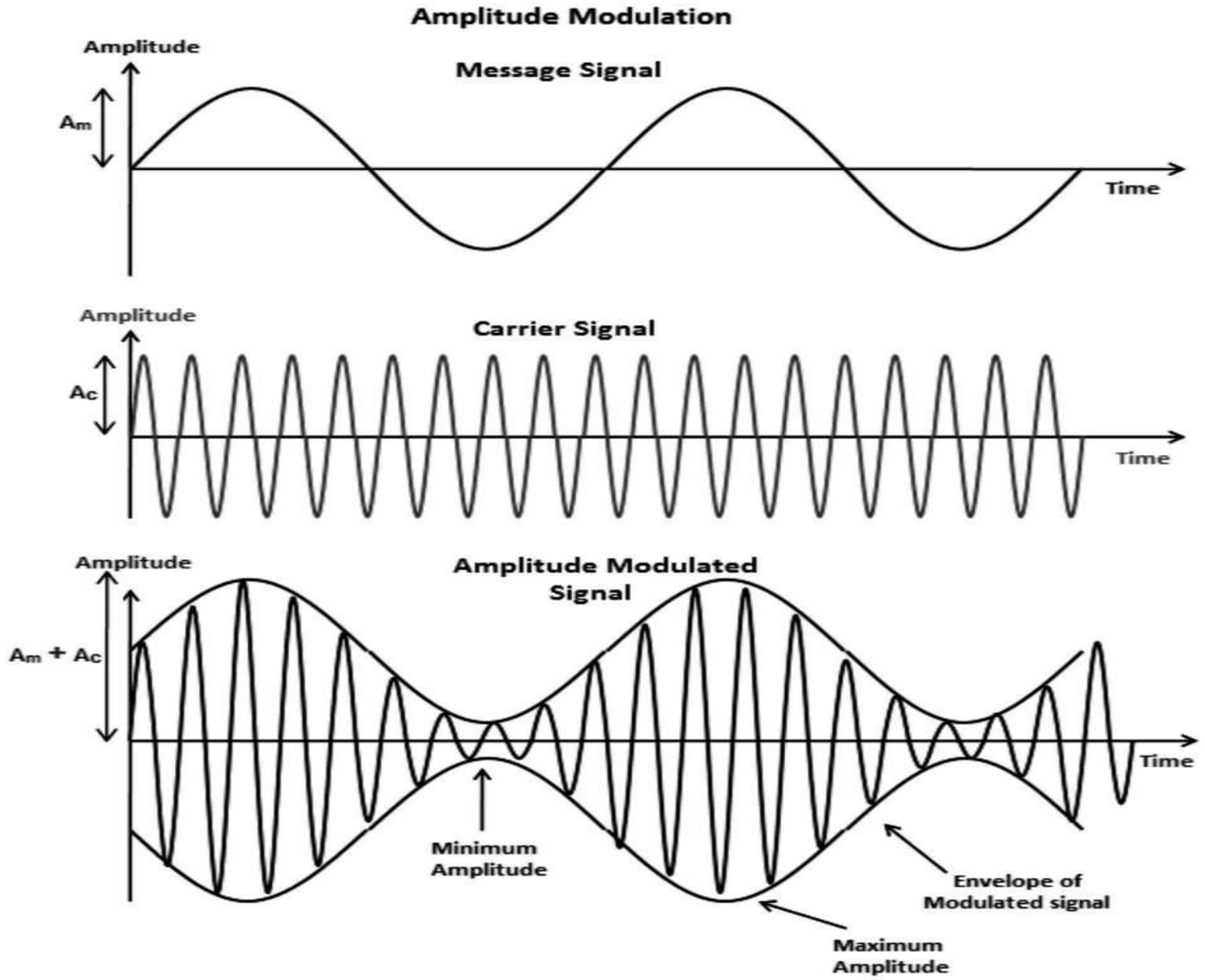
- The size of the antenna gets reduced
- There’s no scope for signal mixing
- The communication range increases
- Multiplexing of signals occurs
- Adjustments in the bandwidth are allowed
- Improvement in the reception quality

TYPES OF MODULATION



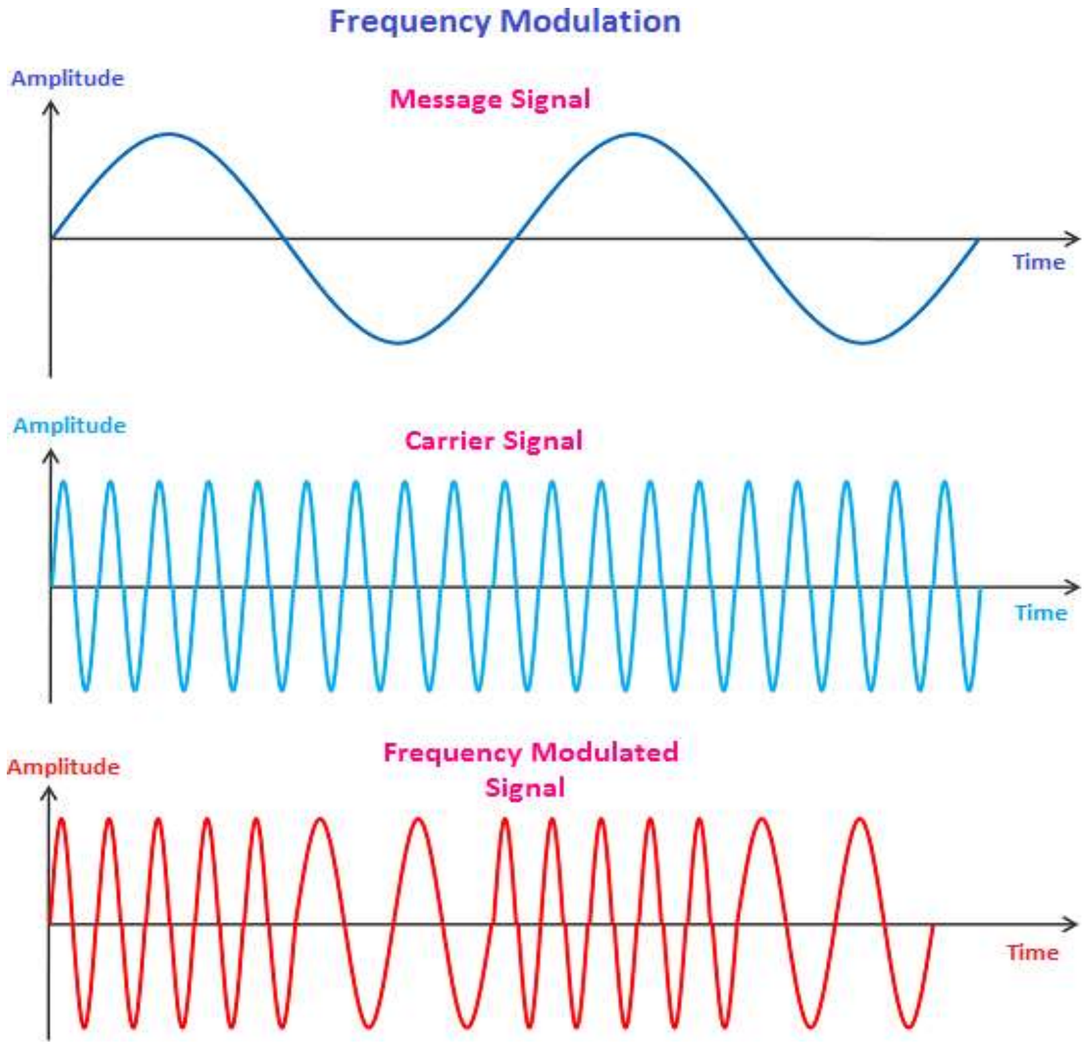
AMPLITUDE MODULATION

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



FREQUENCY MODULATION

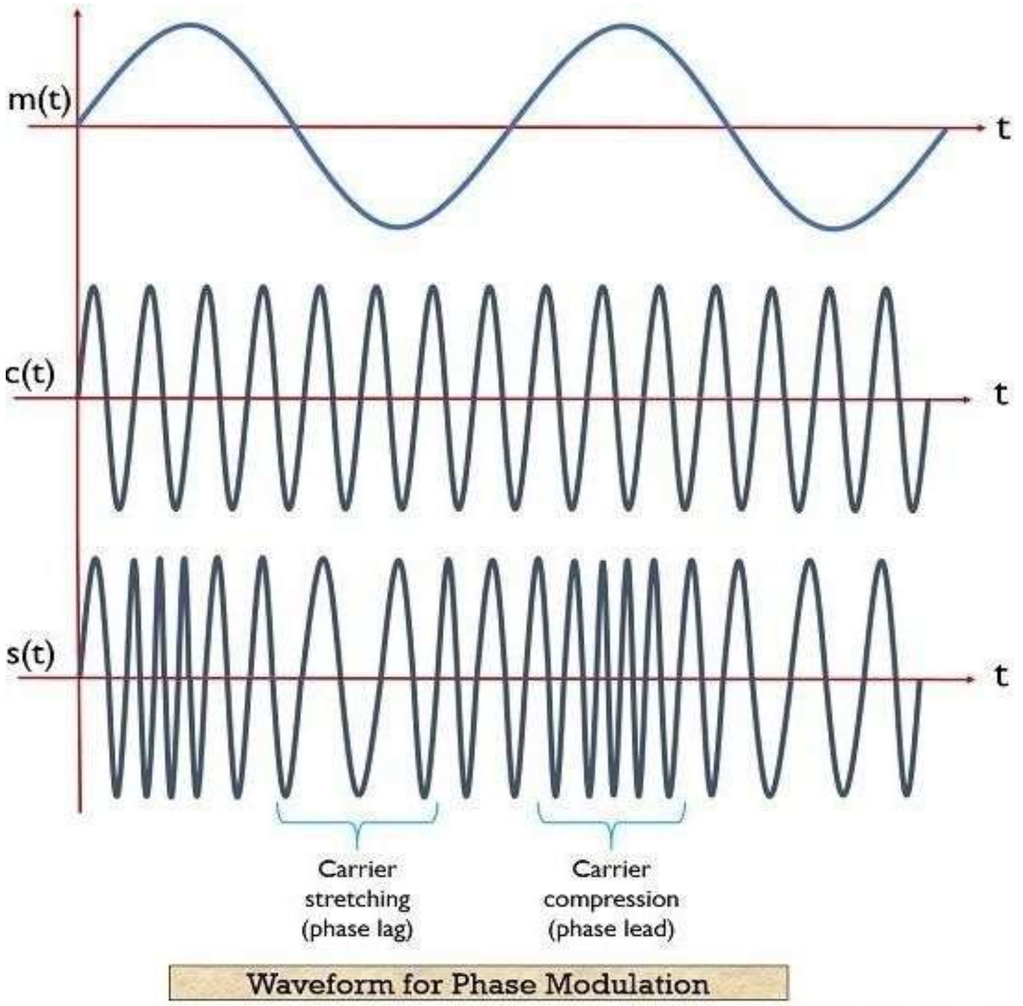
- Modulation in which the Frequency of a carrier wave is varied in accordance with some amplitude of the modulating signal.
- Amplitude of Carrier Signal is constant.



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.



Waveform for Phase Modulation

USE OF MODULATION

- One of the most common uses of different types of modulation is the inter-conversion of signals from its existing to another form.
- Digital Modulation is used for the transmissions of the digital signals over analog baseband.
- Analog Modulation is used to transfer the low bandwidth signals such as TV or radio signals over a higher bandwidth.
- Modern modulation techniques are widely used to carry out FDM, that is, Frequency Division Multiplexing

ASSESSMENT

1.Why we go for Modulation?
2.Explain the different types of modulation
3.What is the use of modulation?

THANK YOU