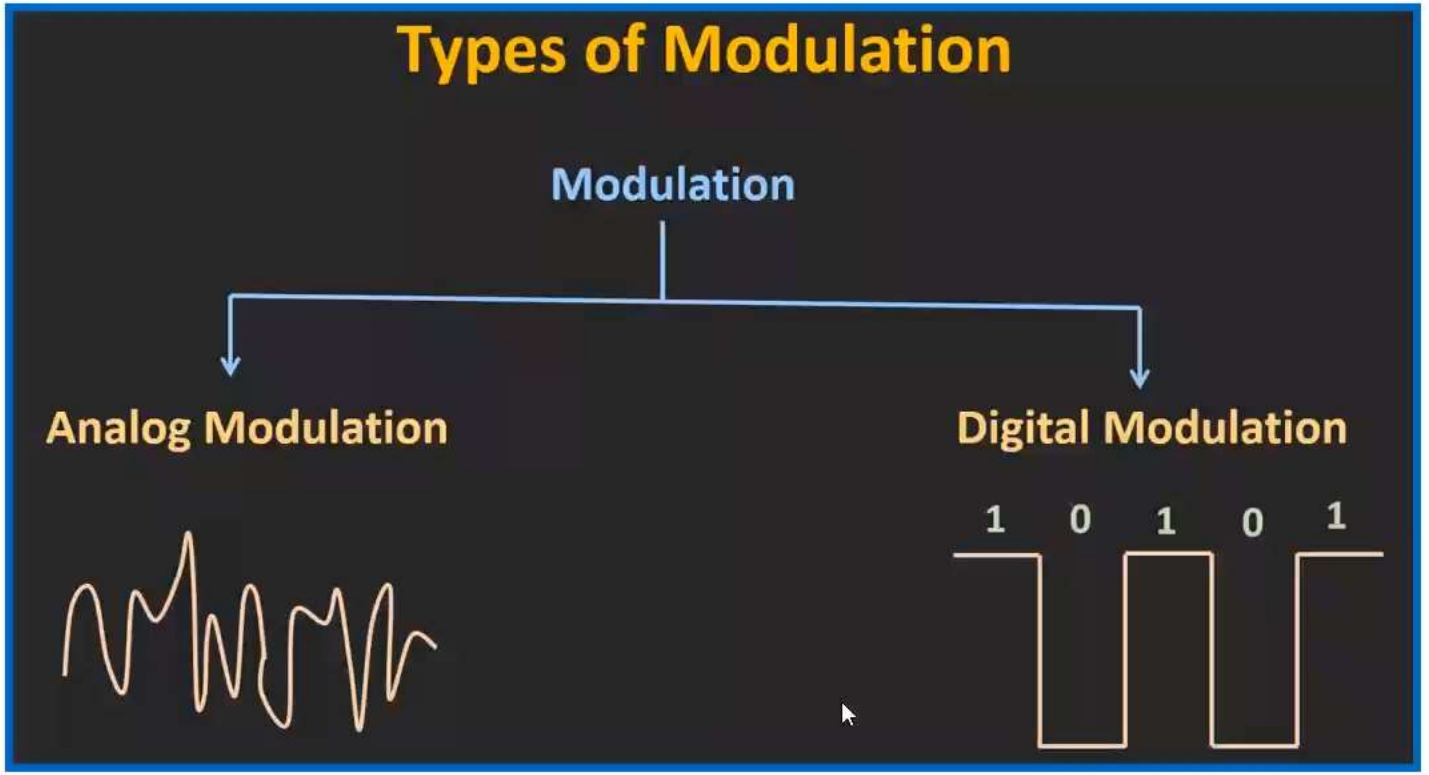
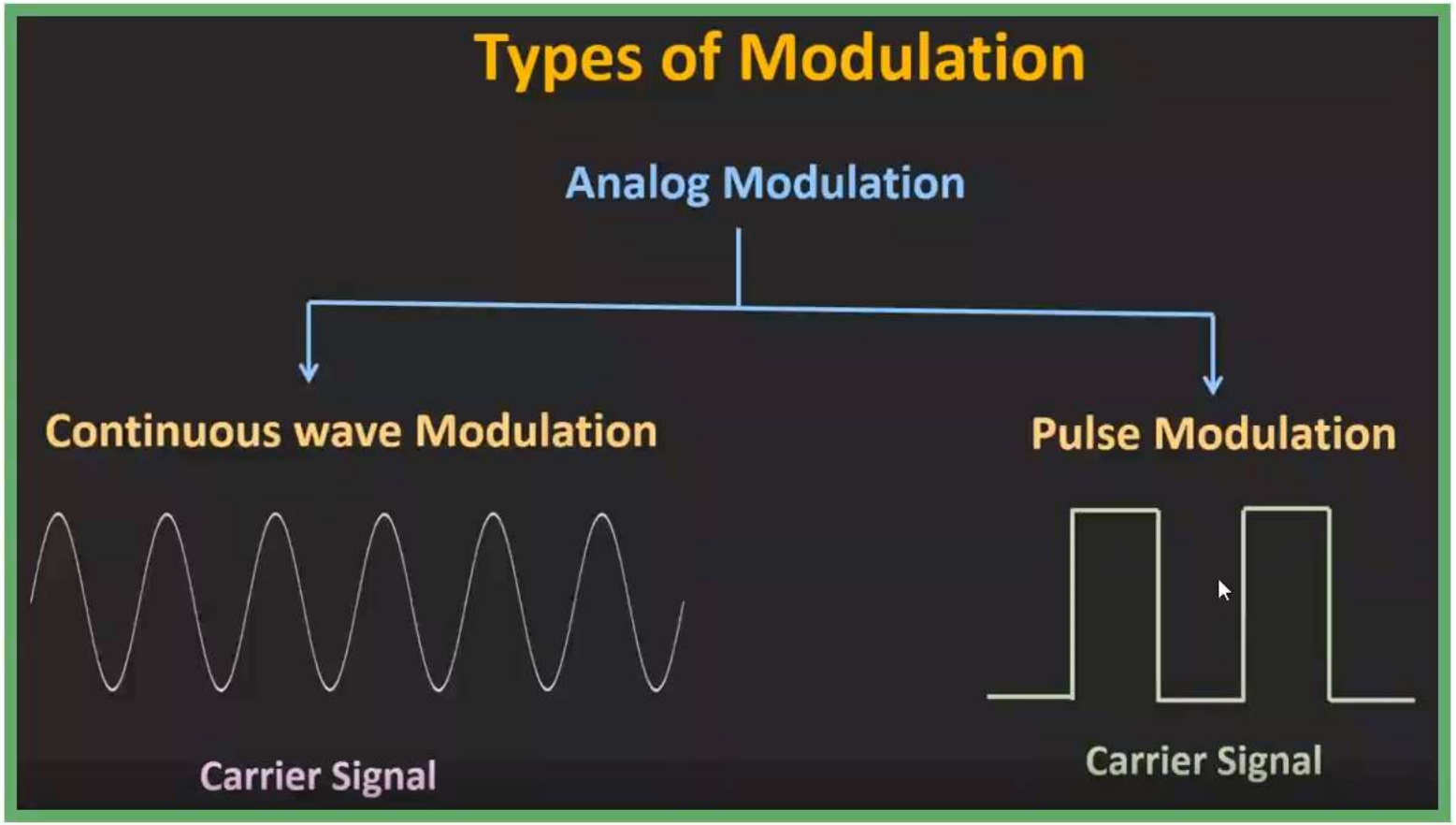
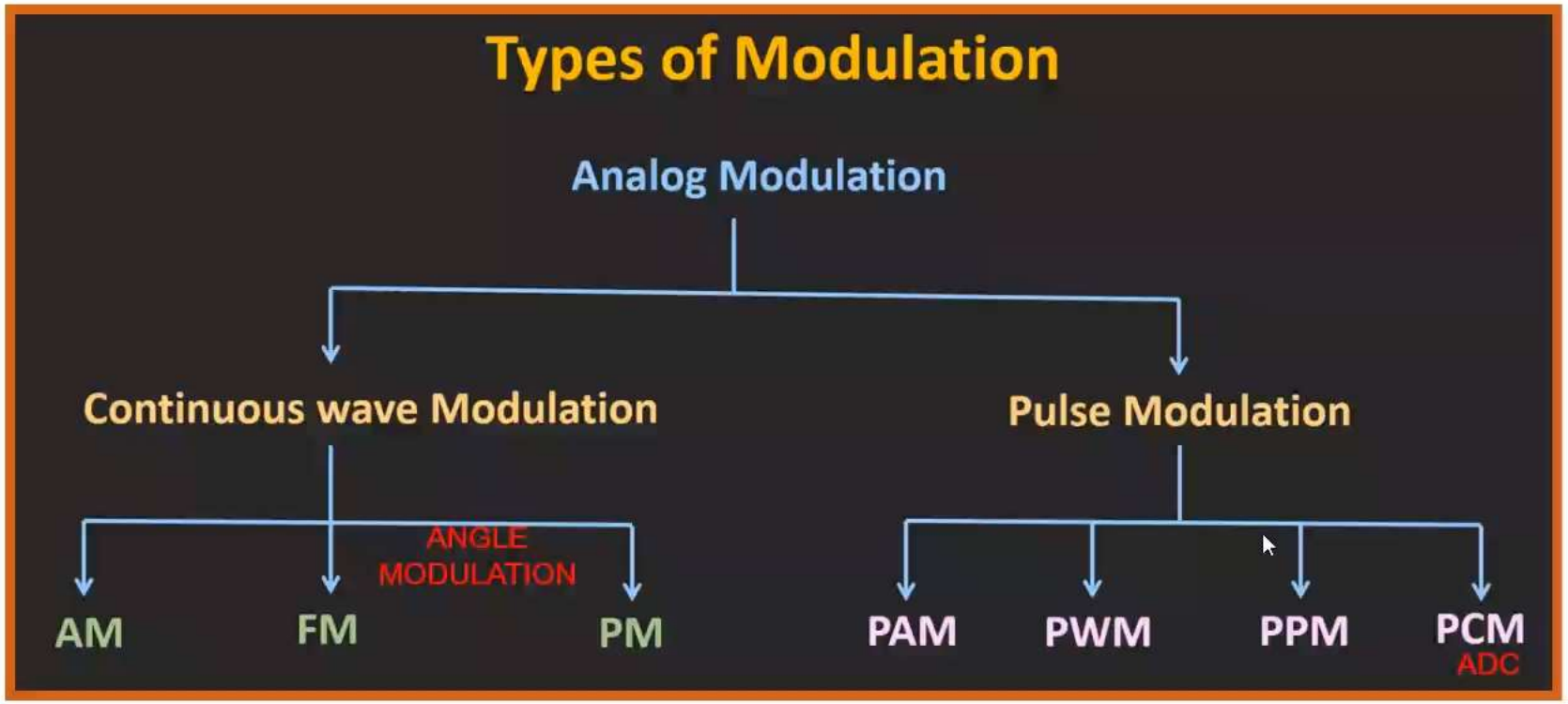
Types of Modulation



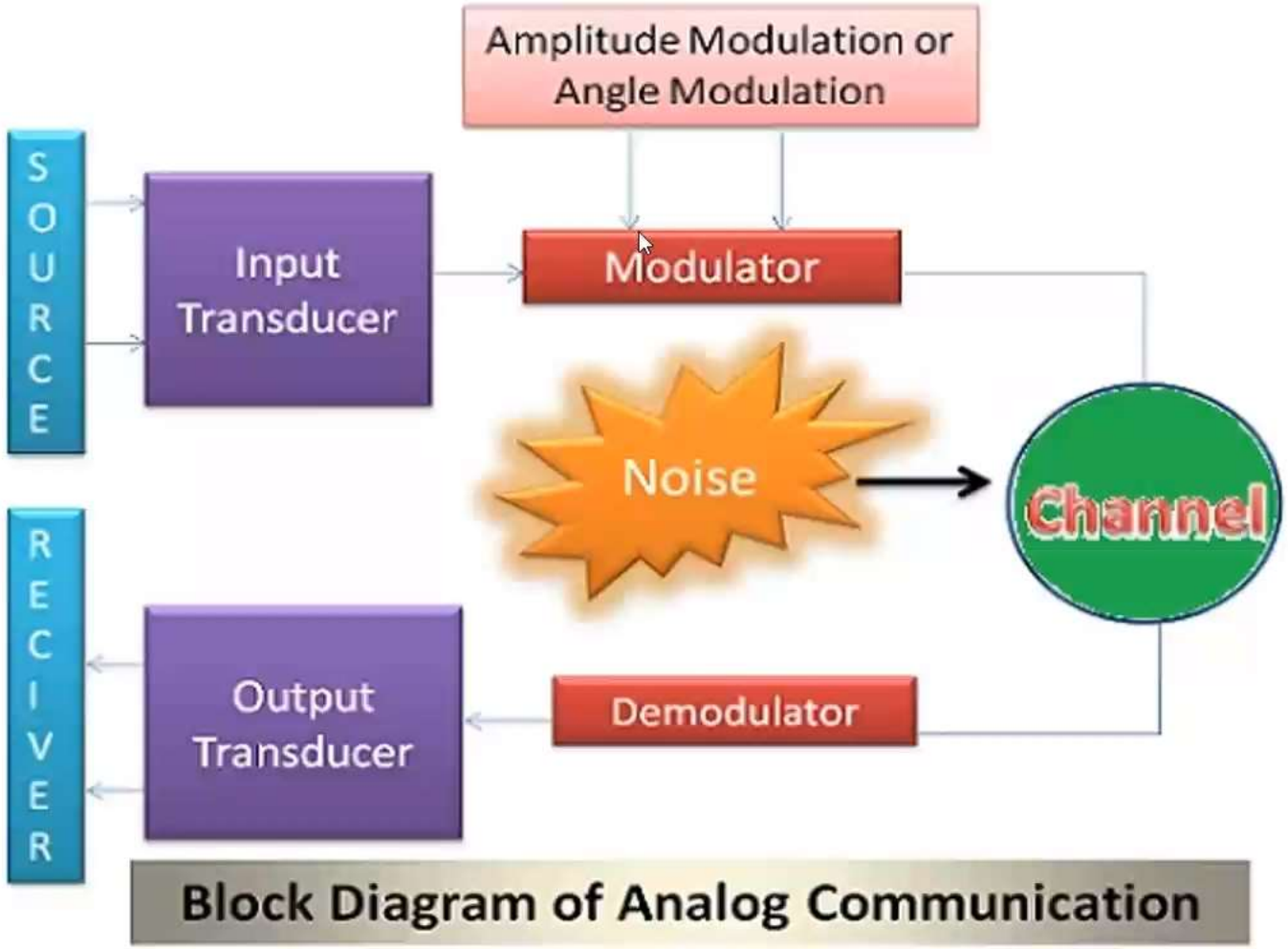
Types of Analog Modulation



Types of Analog Modulation

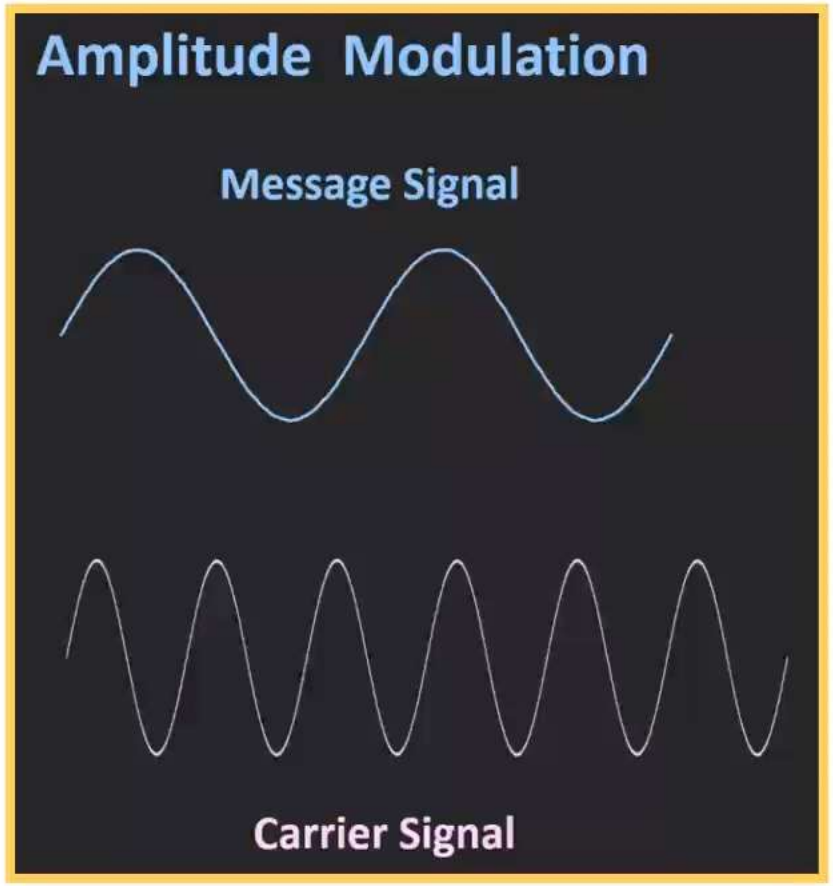


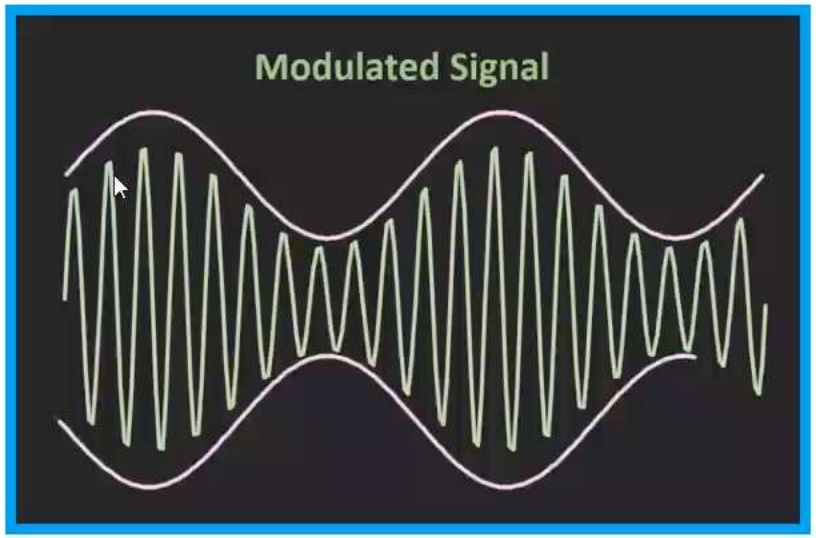
Block Diagram of Analog Modulation



Block Diagram of Analog Communication

Amplitude Modulation





Definition of Amplitude Modulation

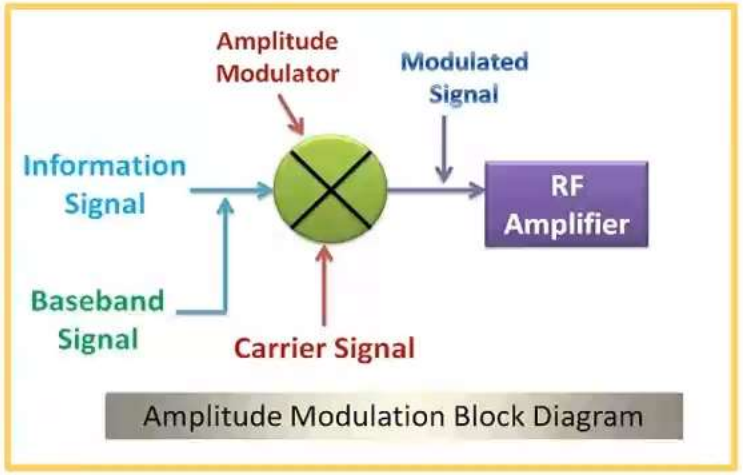
The amplitude modulation is the process of transmitting the information signal by superimposing it on the high-frequency wave called **carrier wave.** The information signal can be of any type based on the type of information it is carrying such as voice, data etc.

In case of amplitude modulation, the amplitude of the carrier wave modulates, i.e. it varies with the amplitude of the information signal. Thus, the modulation is called **amplitude modulation.** It is to be noted that the frequency and the phase of the carrier remain constant during amplitude modulation.

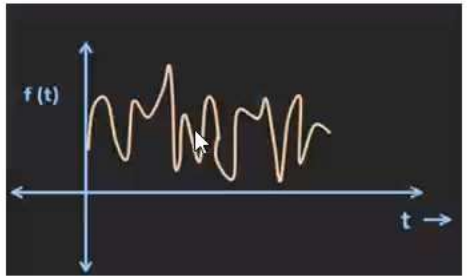
The main drawback of the using amplitude modulation technique is the **lower efficiency** and **poor quality.** The modulated signal obtained from amplitude modulator does not resemble the transmitted signal as its quality gets degraded. Besides, the noise immunity of amplitude modulators is also poor.

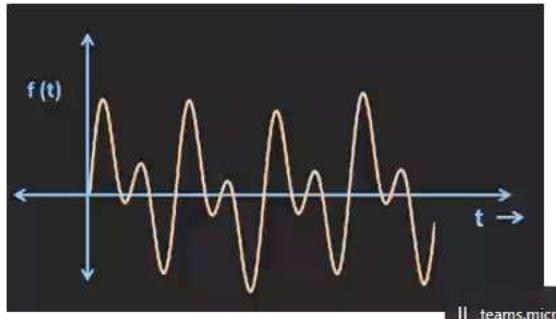
The advantage of using amplitude modulation technique is that it requires **low bandwidth** which makes it less costly.

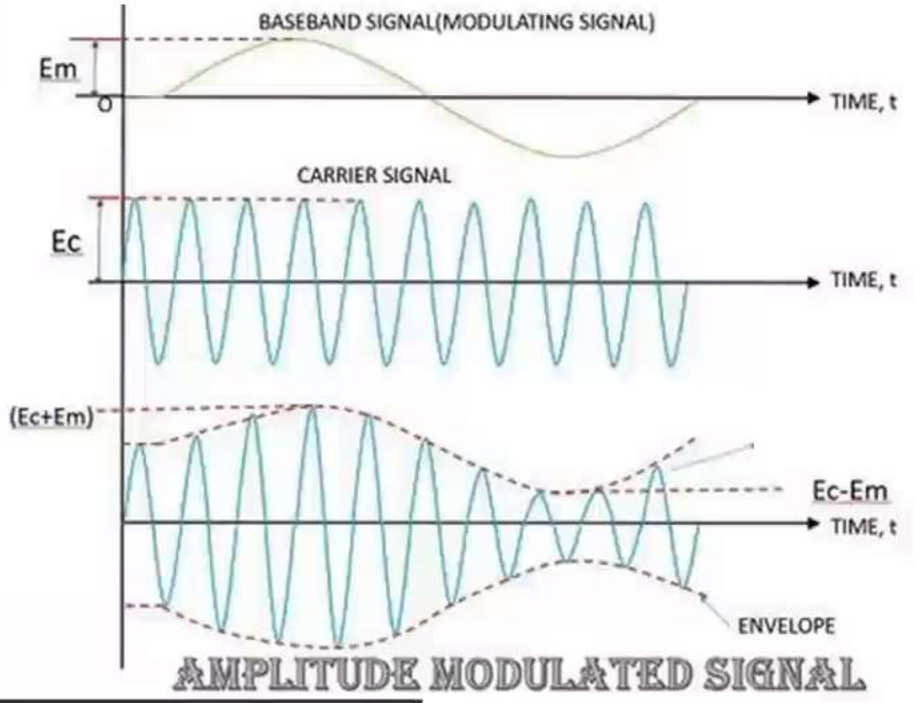
Amplitude Modulation



Amplitude Modulation Block Diagram







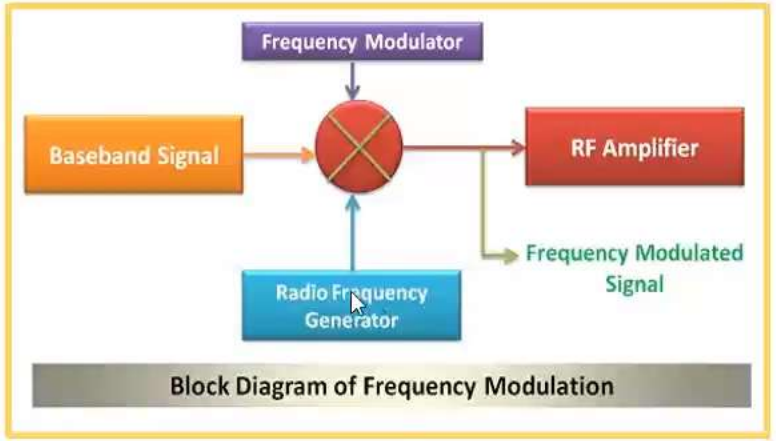
Definition of Frequency Modulation

The **frequency modulation** is the technique of modulation in which the frequency of the carrier signal is varied in accordance with the frequency of the information or baseband signal keeping the amplitude of carrier signal constant.

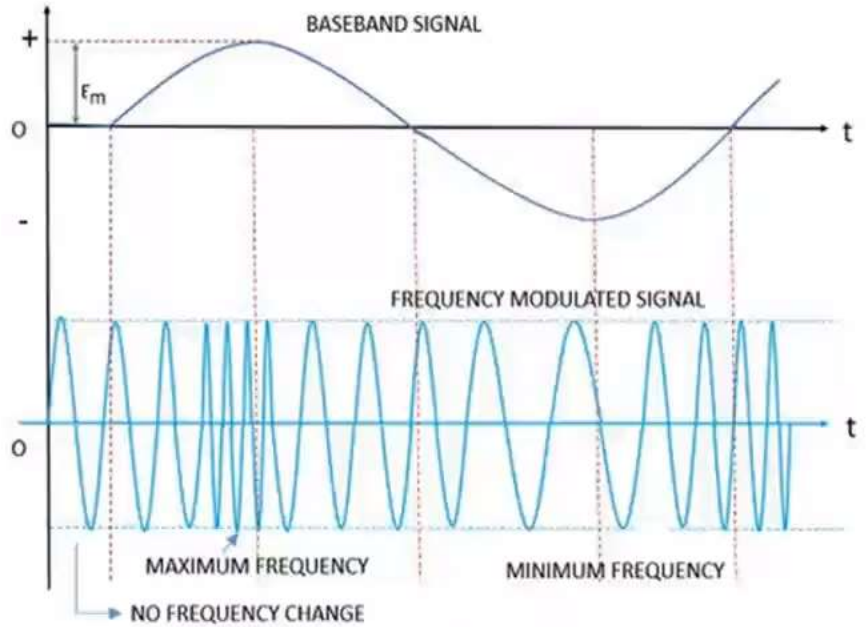
The main advantage of using the frequency modulation technique for transmission is that quality of the transmitted signal does not deteriorate. But the frequency modulation system is complex to design thus, the cost of such system are quite high.

The frequency modulation system is immune to **noise distortion.** Thus, the effect of noise on the frequency modulated signal is extremely low that it can be neglected.

Frequency Modulation



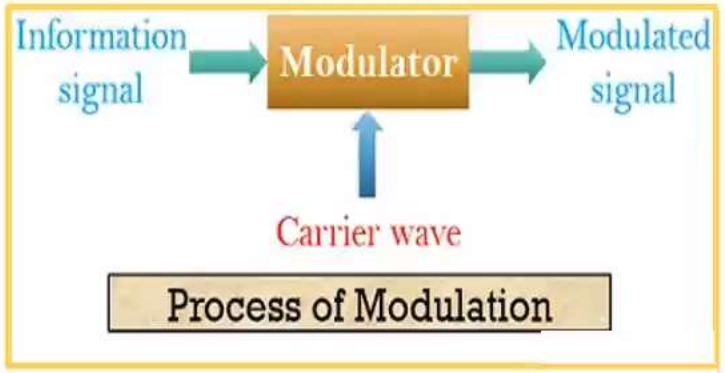
Block Diagram of Frequency Modulation

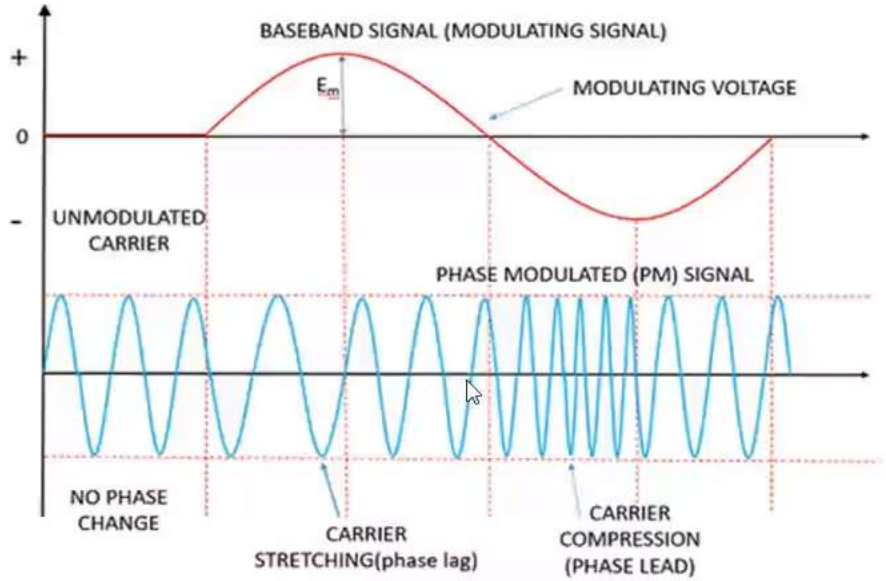


FREQUENCY MODULATED SIGNAL

Phase Modulation

Phase Modulation: Here, the phase shift of the carrier is varied according to the amplitude of carrier wave. When we apply phase modulation it leads to change in frequency too.





PHASE MODULATED SIGNAL

- **Pulse Analog Modulation**: In pulse modulation, the **carrier is in the form of pulse** rather than being a sine wave as in other types of modulation.
  - **Pulse amplitude modulation or PAM**: In this, the amplitude of carrier which is in the form of pulses is varied according to the amplitude of modulating the signal.
  - **Pulse width modulation or PWM**: The width of the pulsed carrier is varied according to the amplitude of modulating the signal.
  - **Pulse position modulation or PPM**: The position of the pulses is varied according to information-bearing signal in pulse position modulation.