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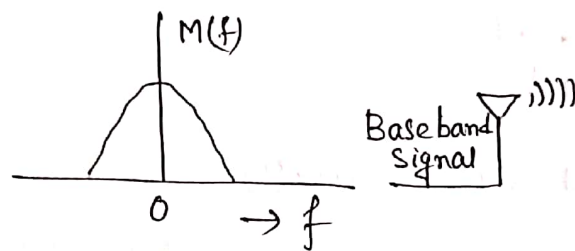
Sem - VI (H)

Paper - DSE 3

Topic - Analog communication

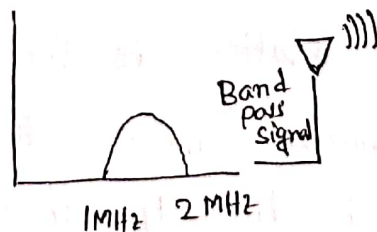
Concept of modulation:- If a signal consist of significant lower frequencies (up to 10 KHz) known as base band signal ex- voice, audio, video etc.

Base band signal can not transmitted directly through an antenna.



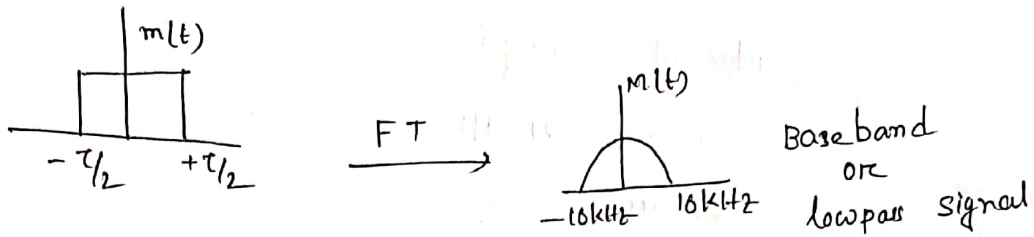
If a signal consist of significant higher frequencies ($> 100\text{ KHz}$) known as pass band or Bandpass signal.

Band pass signal can be transmitted directly through an antenna.



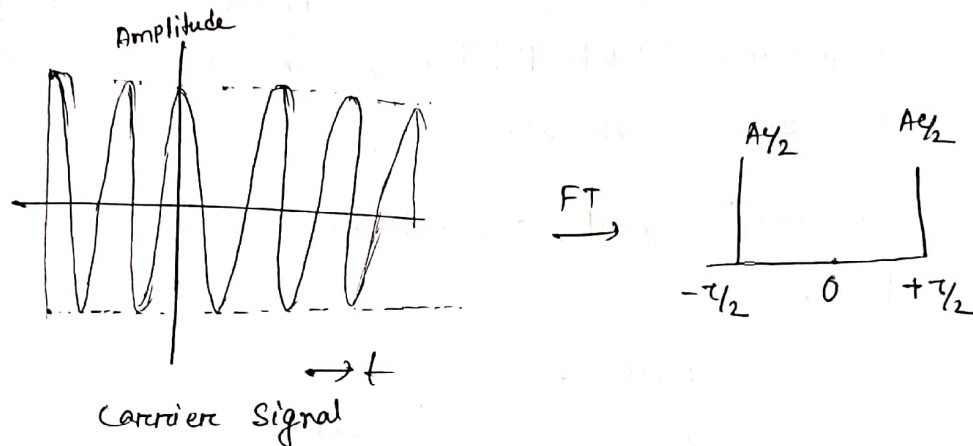
By modulation the signal is translated from lower frequency region to higher frequency region or we can say Base band signal is converted in to Band Pass signal.

Assume a message signal $m(t)$



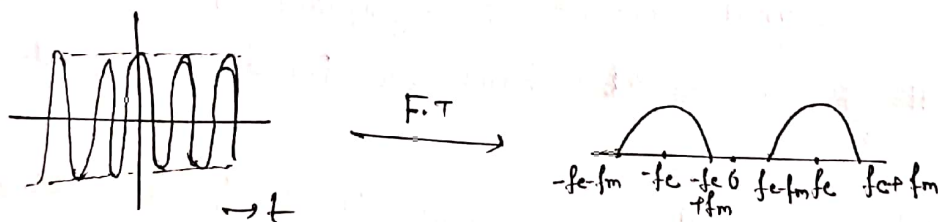
carrier signal $c(t) = A_c \cos 2\pi f_c t$

Let $f_c = 1\text{ MHz} = 1000\text{ kHz}$

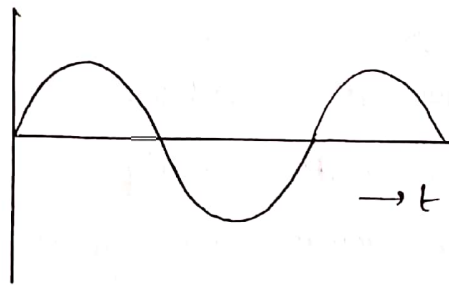


Modulated signal $S(t) = m(t)c(t)$

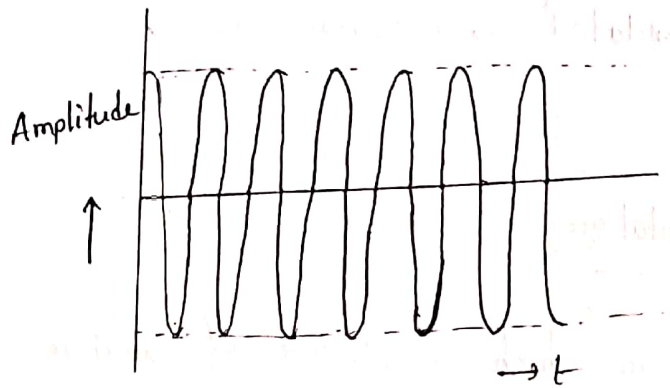
$$= A_c m(t) \cos 2\pi f_c t \xrightarrow{\text{F.T}} \frac{A_c}{2} [M(f+f_c) + M(f-f_c)]$$



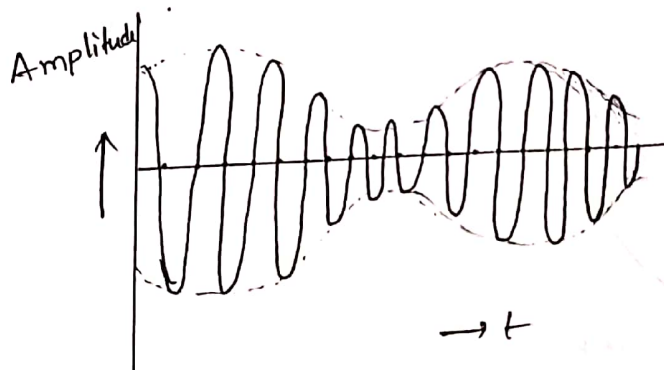
Defination of Modulation:- Modulation is the process in which one of the characteristic parameter (i.e Amplitude, frequency, or phase) of the carrier is varied linearly with respect to message signal. amplitude variations.



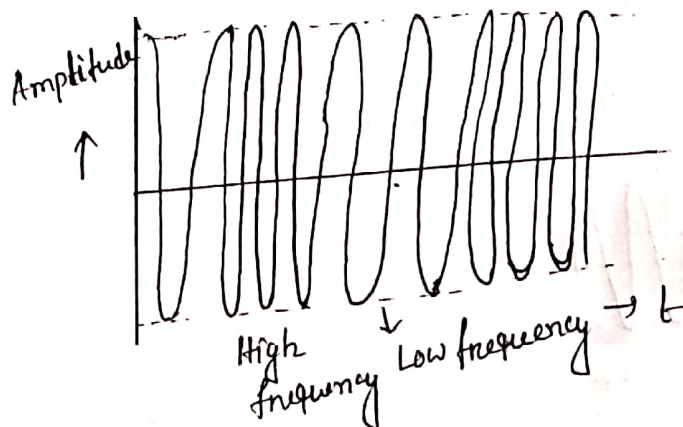
message signal



Carrier signal



Amplitude modulated signal.



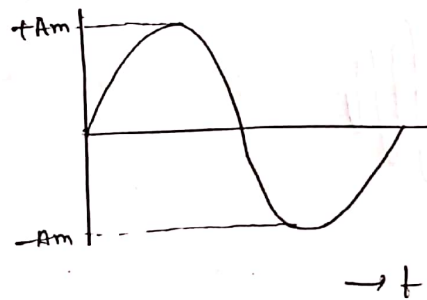
Frequency modulated signal

Concept of Amplitude modulation :-

Amplitude modulation is a modulation technique used in electronic communication, most commonly for transmitting information via a radio carrier wave. In amplitude modulation, the amplitude of the carrier wave is varied in proportion to that of the message signal being transmitted. In this case the frequency of the amplitude modulated wave remains the same as that of the carrier wave.

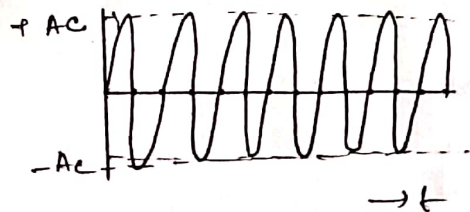
Defination of Amplitude modulation :-

It is ^{the} a process in which amplitude of carrier signal changes w.r.t message signal.

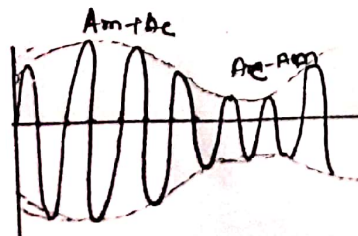


Modulating signal or message signal.

Let modulating signal $m(t) = A_m \sin \omega_m t$



carrier signal $c(t) = A_c \sin \omega_c t$



Modulation index := Modulation index of a modulation scheme describes by how much the modulated variable of the carrier signal varies around its unmodulated level.

Modulation index is defined as the ratio of the amplitude of modulating signal to amplitude of carrier signal.

Let message signal $m(t) = A_m \sin \omega_1 t$
 $c(t) = A_c \sin \omega_2 t$

$$\therefore \text{Modulation index} = k \frac{A_m}{A_c}$$

Frequency modulation := In frequency modulation the frequency of the carrier wave is varied according to the amplitude of the message signal.

