

LAB-2

$m(t) = \cos(2\pi f_m t)$ → message signal

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

$$f_m = 50 \text{ Hz}, \quad f_c = 300 \text{ Hz}$$

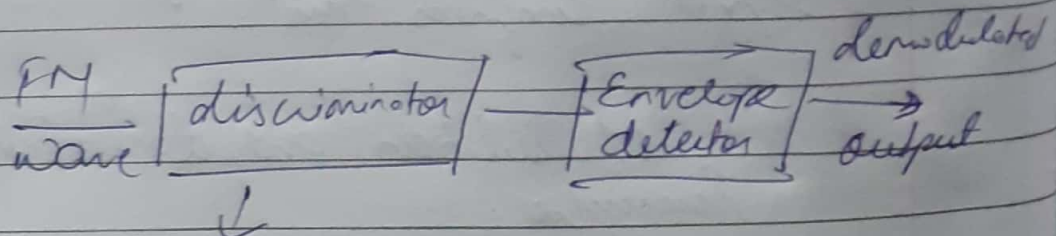
Frequency modulated signal:

$$y(t) = \cos\left(2\pi f_c t + \int_0^t \cos(2\pi f_m z) dz\right)$$

$$y(t) = \cos\left(2\pi f_c t + B \sin(2\pi f_m t)\right)$$

$$B = \text{modulation index} = 10 = \frac{\Delta f}{f_m}$$

The demodulation of FM signal is done using frequency discrimination method. When we differentiate the circuit and pass the resulting signal through an envelope detector which is just a low pass filter.



Used to convert FM wave into combination of AM wave and fm wave.

Frequency domain of message signal is just two impulses at $\pm f_c$.

Frequency domain representation of FM signal has ~~impulses around~~ wide ~~range~~ impulses on both sidebands. This is ~~becc~~ because modulation index in this case is 10 and thus it is a wide band FM.

The PM spectrum is influenced. Influenced by the modulation index as well as ~~to~~ by the ratio of the amplitude of the modulating signal to the frequency of modulating signal.

We will get impulses at $\omega_c + \omega_m$, $\omega_c + 2\omega_m$, $\omega_c + 3\omega_m$. . . and similarly at $\omega_c - \omega_m$, $\omega_c - 2\omega_m$. . .

The frequency plot of demodulated signal ~~is~~ consist of two impulse similar to frequency spectrum of message signal, which confirms that ~~the~~ message signal is modulated and demodulated successfully.