

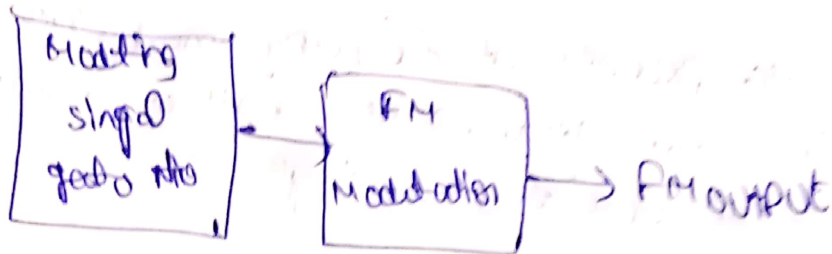
Aim:- To study the process of frequency modulation and demodulation and calculate the depth of modulation by varying the modulating voltage.

Apparatus:-

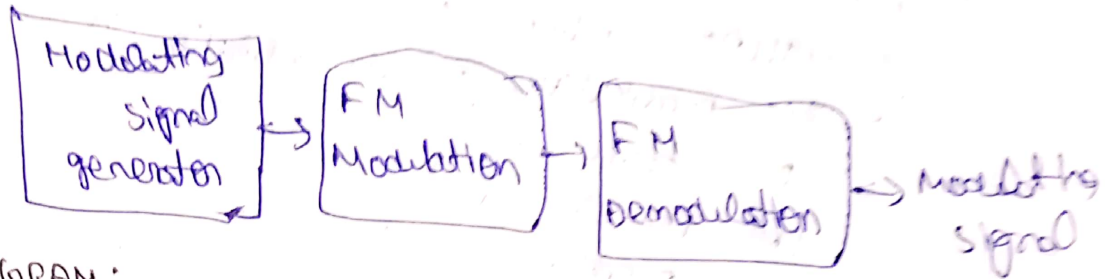
- 1) PC with windows
- 2) MATLAB software with communication toolbox
- 3) FM modulation and demodulation kit
- 4) Dual trace CRO
- 5) CRO Probes
- 6) Patch Cords.

The modulation system in which the modulator output is of constant amplitude in which the signal information is superimposed on the carrier through variations of the carrier frequency. The FM mod is a nonlinear modulation process. Each spectral component of the base band signal gives rise to one or two spectral components in the modulated signal. These components are separated from the carrier by a freq. difference equal to the freq. of base band component. Most importantly, the nature of the modulation is such that the spectral components which produce sidebands on the carrier frequency and the base band frequencies. The spectral components in the modulated wave form depend on the amplitude of modulation index. For FM, defined as $M_f = \text{max freq deviation} / \text{modulating frequency}$.

Mod:



De Mod:-



PROGRAM:

$f_m = 5;$

$f_c = 30;$

$t = 0:0.001:1;$

$A_c = 0.2;$

$A_m = 0.5;$

$K_f = 40;$

$\theta = (K_f \cdot A_m) / f_c;$

$message = A_m \cdot \sin(2 \cdot \pi \cdot f_m \cdot t);$

$carrier = A_c \cdot \cos(2 \cdot \pi \cdot f_c \cdot t);$

$Modulated_signal = A_c \cdot \cos(2 \cdot \pi \cdot f_c \cdot t) + \theta \cdot \sin(2 \cdot \pi \cdot f_m \cdot t);$

$subplot(3,1,1);$

$plot(t, message);$

$title('message signal');$

$xlabel('Time(s)');$

$ylabel('Amplitude');$

$subplot(3,1,2);$

$plot(t, carrier);$

$title('carrier signal');$

$xlabel('time(s)');$

$ylabel('Amplitude');$

$subplot(3,1,3);$

$plot(t, Modulated_signal);$

$title('FM - modulation');$

$xlabel('time(s)');$

$ylabel('Amplitude');$

FOR MATLAB :-

- 1) open the matlab software and click on new.
- 2) now go to script pad and write the code accordingly.
- 3) Now save the file with the name.
- 4) Now run the program and note all observation graphs in observations.

Expected code forms :-