LAB-2

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

$f_m = 50\ Hz$, $f_c = 300\ Hz$

Frequency modulated signal :

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

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

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

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

FM wave → | discriminator | → | Envelope detector | → demodulated output

↓

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 ~~better~~ because modulation index in this case is 10 and thus it is a wide band FM.
The FM spectrum is ~~influenced~~.
influenced by the modulation index as well as ~~th~~ by the ratio of the amplitude of the modulating signal to the frequency of modulating signal.
We will get impulses at $W_c + W_m$, $W_c + 2W_m$, $W_c + 3W_m$ . . . and Similarly at $W_c - W_m$, $W_c - 2W_m$ . . .

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.