

Q1) A message signal $m(t) = 5\cos(6000\pi t) + 8\sin(8000\pi t)$,
If $f_c = 90 \text{ MHz}$, $k_f = 3000$, and $k_p = 4$,

- a) Write the Expression for FM and PM.
- b) Find the instantaneous frequency of FM and PM.
- c) Find the Maximum frequency deviation of FM and PM.
- d) Find the Modulation index of FM and PM.
- e) Find the Bandwidth of FM and PM.

Q2) An FM signal with a carrier frequency of 80 MHz , is fluctuating at a rate of 1000 times per second between frequencies 80.01 MHz and 79.99 MHz . Find the following:

- a) The modulating frequency.
- b) The Maximum frequency deviation.
- c) The modulation index.
- d) The bandwidth of the modulated signal.
- e) Is it NBFM or WBFM? Why?

Q3) In Fig. Q3 the input signal to the FM modulator is given by $m(t) = 6\cos(200\pi t)$.

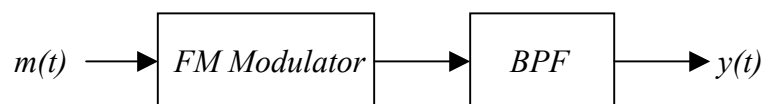


Fig. Q3

- a) Find the modulation index if $k_f = 100$.
- b) Find the bandwidth of the FM signal.
- c) Find the power of $y(t)$ if the ideal band pass filter has center frequency f_c and bandwidth of 700Hz , (Assume $A_c = 1$).