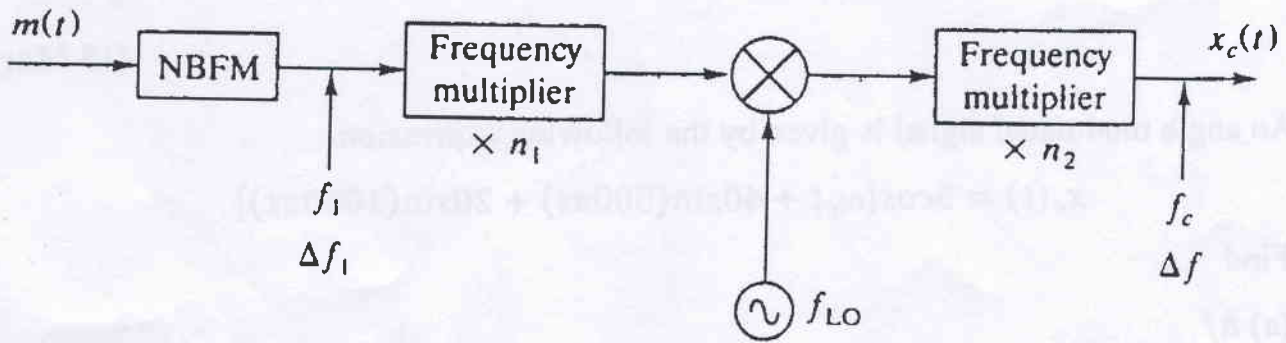


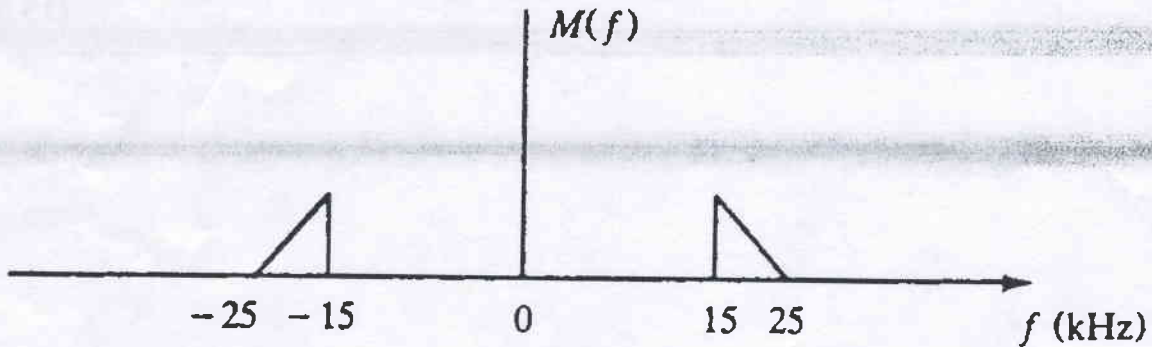
Note: Answer Only Four Questions

Q1) Determine the NBFM frequency deviation Δf_1 and the frequency of the local oscillator f_{LO} if the desired carrier frequency at the output of the FM transmitter f_c is 100 MHz, $\Delta f = 75 \text{ kHz}$, $f_1 = 100 \text{ kHz}$, $n_1 = 150$ and $n_2 = 50$.



(15 Marks)

Q2) A signal $m(t)$ with the spectrum shown below



Calculate the sampling frequency using

- (a) Passband sampling, and
- (b) Baseband sampling.

Draw the spectrum of the resultant sampled signal for each case. How can you recover $M(f)$ from the sampled signal for each case?

(15 Marks)

Q3) Draw a block diagram of a SSB-SC receiver. Then derive in details the S/N ratio at the output of a SSB-SC receiver in terms of S/N at the input to the receiver.

(15 Marks)



Q4) Draw a block diagram to generate

(a) NBPM

(b) How to get a NBFM from the above block diagram of (a).

(15 Marks)

Q5) An angle modulated signal is given by the following expression

$$x_c(t) = 5\cos[\omega_c t + 40\sin(500\pi t) + 20\sin(1000\pi t)]$$

Find

(a) Δf ,

(b) $m(t)$ if $x_c(t)$ is a PM signal with $k_p = 5$ rad/volt,

(c) $m(t)$ if $x_c(t)$ is a FM signal with $k_f = 20000\pi$ rad/sec/volt,

(15 Marks)