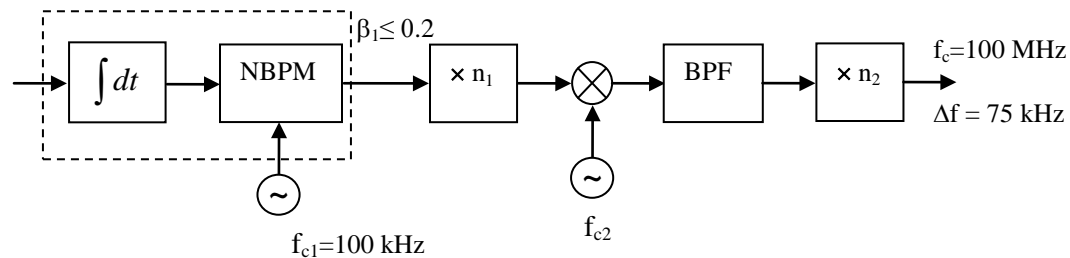


SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY
Department of Electrical and Electronic Engineering
COMMUNICATION PRINCIPLES

Assignment No. 7

1. The indirect FM system shown below is used to transmit a single-tone signal with frequency of 100 Hz. The desired FM signal at the transmitter output has carrier frequency of 100 MHz and maximum frequency deviation of 75 kHz. The modulation index of the narrowband frequency modulator, β_1 , is restricted to a maximum value of 0.2 in order to keep distortion level low. Determine the suitable values of n_1 , n_2 and f_{c2} .



2. Design a wideband FM modulator that uses the indirect method for generating a WBFM signal with the carrier frequency of 50 MHz. The peak frequency deviation of the FM modulator is 50 KHz when modulated by a single tone signal of frequency 10 kHz. Show a complete block diagram of your design, indicating all necessary frequencies and peak frequency deviations of the signals at various points of the modulator. Assume that no frequency converter is used in the system and the modulation index of the involved NBFM modulator is 0.1.
3. A message signal $m(t) = 0.5\cos(2000\pi t)$ phase modulates a carrier signal $f(t) = 10\cos(2\pi 10^6 t)$ with modulation phase sensitivity $k_p = 5.6$ rad/V. If the PM signal is demodulated using the demodulator shown below, show the demodulating process in which signal $m(t)$ is recovered.

