**EC4910: Computer Project 2**

**Introduction**.

In this project we address the problem of designing a Single Side Band (SSB) modulator and demodulator to shift the signal from baseband to an intermediate frequency . Since a signal is sampled at a lower sampling frequency, we need to resample it at the appropriate sampling rate.

The particular SSB demodulator we use is based on *Weaver’s third method* described in the figure below.



**Problem 1**. The signal *opera0.wav* is sampled at  and we want to SSB modulate it by an intermediate carrier at frequency . In order to do so we want to increase the sampling frequency by 24 times to .

Looking at the signal, you see that most of its frequency spectrum is in the interval 80Hz to 5kHz.

Implement the SSB modulator shown below. Verify that the output signal has the desired spectrum. For each filter, clearly specify the passband and stopband. Use at least 50dB attenuation in the stopband.

The implementation must include real signals and real operations only (nothing complex!).



**Problem 2** Implement the SSB modulator as shown in 3 stages as . Again all signals have to be real.

