ECE 3043

Summer 2018 Homework Problem Set 8 for Experiment No. 9

Due First Meeting Week of July 2

The oscillation frequency, f_o, for the oscillators to be designed is the experimenter's birthday (sans year) in kHz for birthdays prior to July and the birthday divided by two for birthdays from July to December. For instance, if the experimenter was born on May 24 the critical frequency is $5.24\,\mathrm{kHz}$ and if the experimenter was born on December 13 the critical frequency is $12.13/2 = 6.065\,\mathrm{kHz}$. The peak value for the output sine wave for each of the oscillators is to be $5\,\mathrm{V}$; a diode limiter circuit is used to set the output level.

1. Design a Wien bridge oscillator.
2. Design a phase shift oscillator.
3. Design a quadrature oscillator.

Simulate each of the circuits designed above with both National Instruments (Multisim) and LTSpice. The appropriate analysis is transient. The time interval should be large enough to display several cycles of the waveform so the frequency of oscillation can be determined. Use an appropriate model for the op amp; the ideal op amp won't suffice.

Plot the Bode plots of the open loop circuits from a frequency a decade below f_o to a decade above. Make the same plots with both Mathcad and Matlab.

Each of these oscillators will be built in lab.