

ENEE 417 - Spring 2019

Week #4 starting W 02/26-03/02/19

Designs #2: Ring and Phase Shift Oscillator Designs; Spice Design

In this experiment a good reference is Sedra and Smith (pages 1239 & 1345 of the 6th edition) [pages 1275 and 1393 of the 7th edition].

For the active devices use the 4007 CMOS transistor package and 1458 Op-Amps.

1. Construct both a three stage and a five stage ring oscillator and record via the scope/computer interface the oscillations. Check the results of Figure (15.28 of 6th) [16.28 of 7th] of the above references.

Insert various capacitors at the outputs of the stages and see the effects. Among the capacitor values use one of the super-capacitors (whose values are on the order of Farads). Check also the effect of using an even number of stages.

2. Using an Op-Amp amplifier realize the phase shift oscillator of Fig. (17.7 of 6th)[18.9 of 7th] using $R=10\text{Kohm}$ and C as $15\text{nFd} = 15,000\text{pFd}$ and 18nFd .

3. In Spice use MOSIS 1.2u level 4 CMOS model parameters, available in the bicmos12.lib files, to design a three stage inverter ring oscillator (for this adjust the W and L so that a symmetric bias yields zero output voltage for zero input voltage; make sure that both W and L are bigger than 7microns).