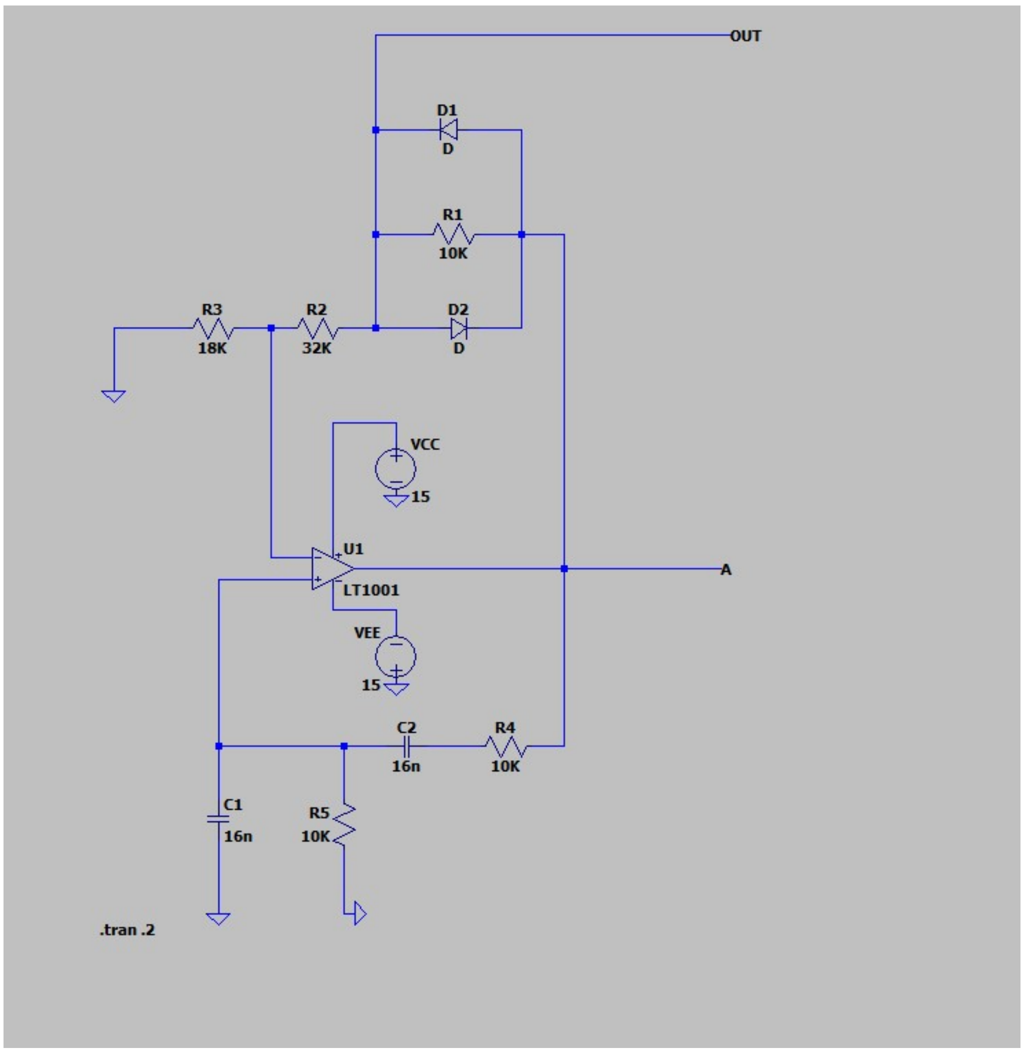
Wein Bridge Oscillator :-

We shall simulate the operation of the Wien-bridge oscillator whose Capture schematic is shown below . The component values are selected to yield oscillations at 1 kHz. We would like to investigate the operation of the circuit for different settings ofRy, and Rlb, with Rla + Rlb = 50 kQ . Since oscillation just starts when (R2 + Rlb)/Rla = 2 (see Exercise 13.4), that is, when Rla = 20 k Q and Rlb = 30 kQ, we consider three possible settings: (a) Rla=l5 kQ, Rlb = 35 kQ; (b) Rla=U kQ, Rlb = 32 kQ; and (c) Rla = 25 kQ, Rlb = 25 kQ. These settings correspond to loop gains of 1.33,1.1, and 0.8, respectively.



1. When R3 = 15k

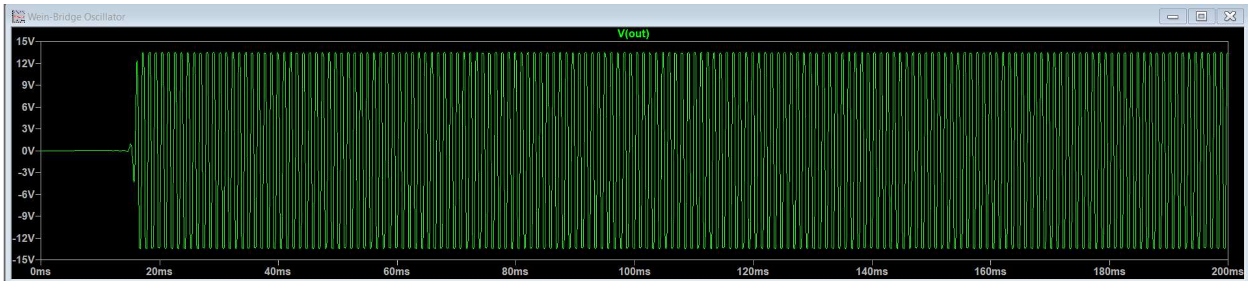


Fig.1 a

2. When R3 = 18k

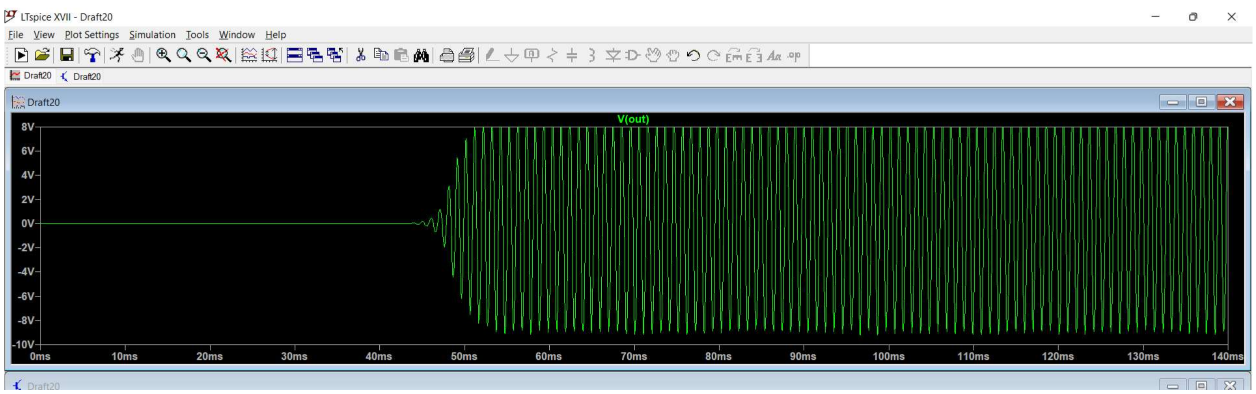


Fig.1 b

3. When R3 = 25k

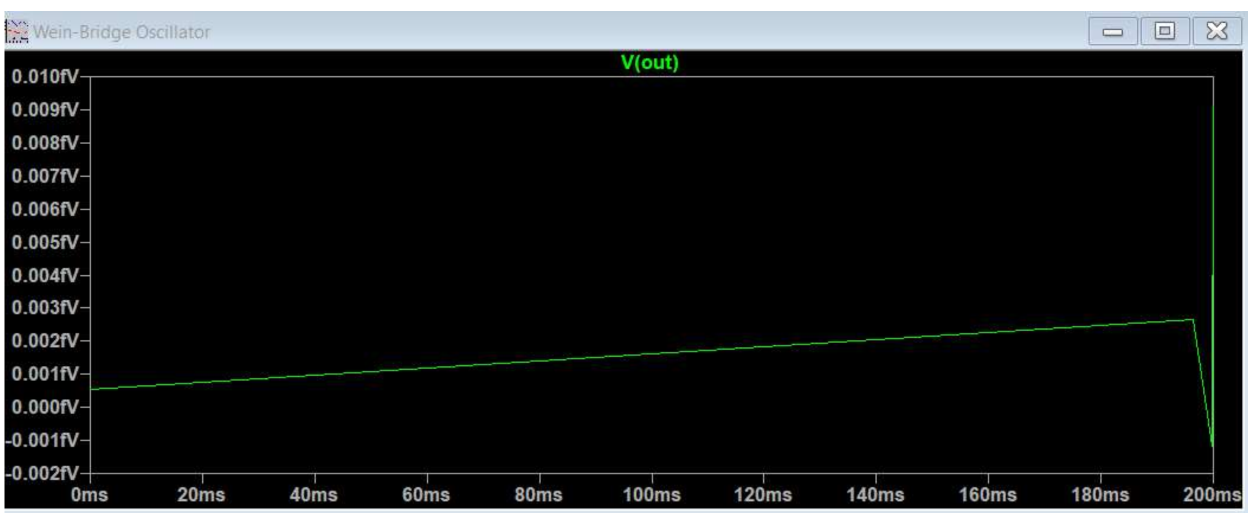


Fig.1 c

The graph in Fig.1(a) shows the output waveform obtained for a loop gain of 1.33. Observe that although the oscillations grow and stabilize rapidly, the distortion is considerable. The output obtained for a loop gain of 1.1, shown in Fig. 1(b), is much less distorted. However, as expected, as the loop gain is reduced toward unity, it takes longer for the oscillations to build up and for the amplitude to stabilize. For this case, the frequency is 986.6 Hz, which is reasonably j close to the design value of 1 kHz, and the amplitude is 7.37 V. Finally, for a loop gain of 0.8, the j output shown in Fig. 1(c) confirms our expectation that sustained oscillations cannot be obtained when the loop gain is less than unity. When the oscillator output is taken at the op-amp output (voltage Va), a THD of 2.57% is obtained, which as expected is higher than that for the voltage ; Vout) but not by very much. The output terminal of the op amp is of course a much more convenient place to take the output.