Alexandria Institute of Technology
Electronics Section

Course: Analog Integrated Circuit
Instructor: Prof. M. El-Banna
Term: Winter

Sheet 7:
Electronics Section
Time: SAT 12:00-2:00pm

1- For the circuit shown in figure (1) find L(s), L(jω), the frequency for zero loop phase, and R_2/R_1 for oscillation.
2- Consider the bistable circuit shown in Fig. (2):
   a) Derive an expressions for the threshold voltages V_{TL} and V_{TH} in terms of op-amp saturation levels L_+ and L_- , R_1, R_2 and V_R.
   b) If $L_+ = -L_- = V$ and $R_1 = 10\ k\Omega$, find R_2 and V that results in the threshold voltages of 0 and V/10 .
3- Figure (3) shows a monostable MV circuit. In the stable state ,$v_O=L_+$, $V_A=0$, and $V_B=-V_{ref}$. The circuit can be triggered by applying a positive input pulse of height greater than Vref. For normal operation , $C_1R_1 << CR$. Show the resulting waveforma of v_O and Va. Also show that the pulse generated at the output will have a width T given by:

$$T = CR\ln\left(\frac{L_+ - L_-}{V_{ref}}\right)$$

Note that this circuit has the interesting property that the pulse width can be controlled by changing Vref.

4- Consider the 555 timer when the Threshold and the Trigger input terminals are joined together and connected to an input voltage v_I. Verify that the transfer characteristics v_O-v_I is that of an inverting bistable MV circuit with thresholds $V_{TL}=\frac{1}{3}V_{CC}$ and $V_{TH}=\frac{2}{3}V_{CC}$ and output levels of 0 and V_{CC}.

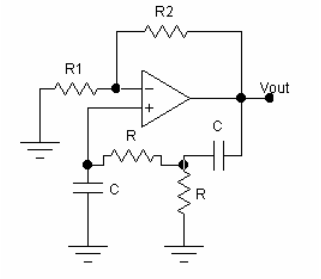
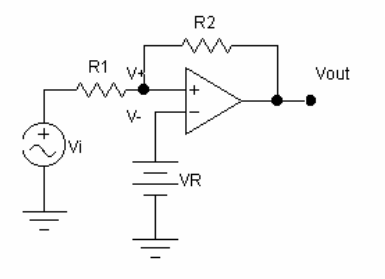
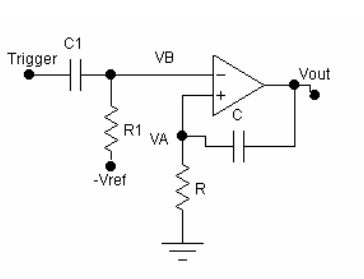


Figure (1)



Figure(2)



Figure(3)