1. Describe the following terms used in operational amplifier: (a)compensation capacitor; (b)slew rate; (c)CMRR; (d)offset voltage; (e)gain-bandwidth product.(15%)

2. Design a band-pass active filter with pass band frequencies of 10 - 100 Hz, and draw the circuit and derive the values for the R and C elements.(15%)

3. Use the NOR gates to realize (a) NOT gate (b) RS flip-flop (c) D-type flip-flop. Give the truth tables for (b) and (c).(20%)

4. For the circuit as shown in Figure 1, find the frequency of oscillation and the minimum value of R.(15%)

5. A CS-CS cascade uses identical JFETs whose parameters are: g_m=1 mS, R_d=40 kΩ, C_{gs}=5 pF, C_{gd}=1 pF, and C_{ds}=1 pF. (a) With R_s=5 kΩ, R_{D1}=40 kΩ, and R_{D2}=10 kΩ, determine A_{vo} and the approximate value of f_H. (b)Estimate the frequency of the nearest nondominant pole.(20%)

6. For a circuit with $v_E(t)$ as shown in Figure 2, the transistor has β_F=100 and negligible reverse saturation current. The input voltage v_i in the circuit is $v_i(t)=2.0+1.0sin2\pi10^3t$. Sketch $v_o(t)$ for one cycle.(15%)
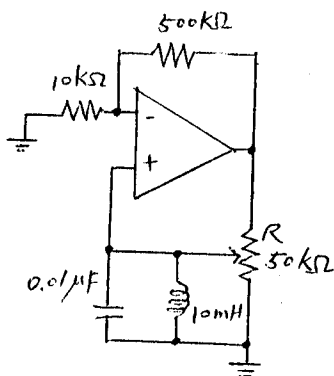
Figure 1

Figure 2