

Structured Electronic Design, Exercise 4

You can work on these exercises during the entire lecturing period. You will not find solutions on Blackboard yet. Some will be made available later. However, it is better to discuss your answers with other students and the professors. You will learn much more.

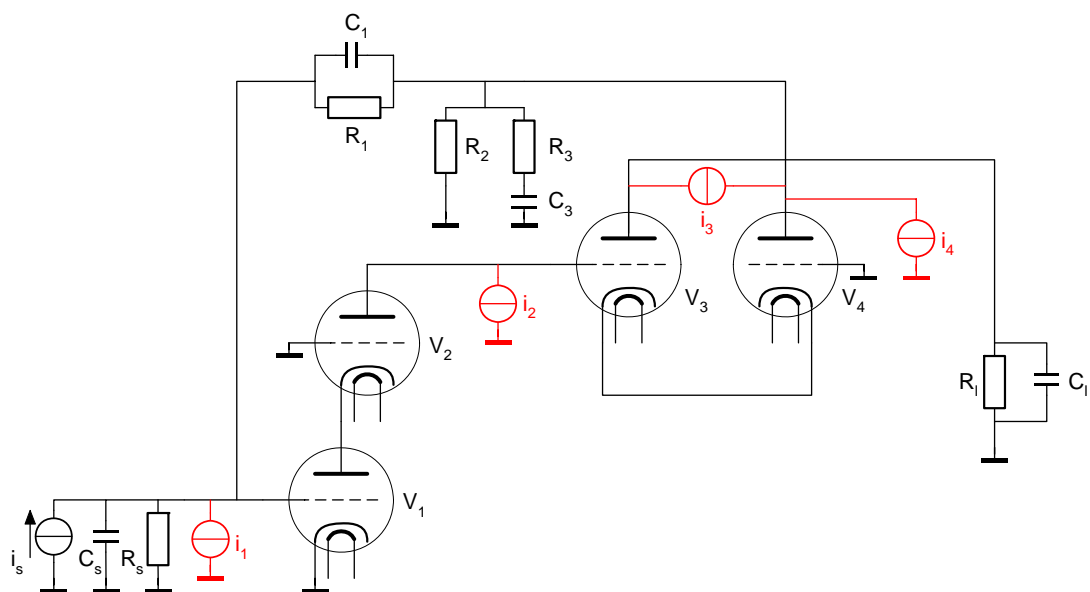
This exercise related to a demonstration that will be given in lecture 3. For some of the questions you may want to wait until you followed this lecture. However, studying this circuit in advance will make it easier for you to understand what happens during the demonstration.

The diagram below shows a vacuum-tube amplifier with:

$R_1=503k$, $R_2=56k$, $R_3=1.8k$, $R_4\approx 50k$, $R_s\approx 100k$

$C_1=10p$, $C_2=89p$, $C_3\approx 100p$, $C_s\approx 80p$

(Sources $i_{1..4}$ model noise sources, in the demonstration a sine-wave generator will be used instead.)



1. Which modern semiconductor component comes closest to the behavior of a vacuum tube?
2. What is the amplifier type?
3. Indicate where the output signal can be measured.
4. What is the gain of the amplifier?
5. Each of the noise sources $i_{1..4}$ produce a signal at the output. When all sources have the same magnitude, explain the difference in magnitude of the signal they produce at the output and sort them with respect to this difference.
6. What design-rule follows from this for the parameters in the chain-matrix of tube V_1 ?
7. What is the influence of the load impedance on the loop gain?
8. What is the influence of the source impedance on the loop gain?