

# VE311 Electronic Circuits

## Homework 05

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The course homework is intended for the students to learn and to think rather than just copy and paste. This is why, me and my TAs team are confident that you're going to learn.

- Single Transistor Amplifiers

1. Find the gain and input signal range for this amplifier. In contrast with the example seen in lecture, the performance of this array was actually improved? By considering a  $\beta_{F1}=17$  and  $\beta_{F2}=23$ ,  $K_n = 0.3 \text{ A/V}^2$ ,  $T_{TN}=-3 \text{ V}$ ,  $\lambda = 0.01 \times 10^{-2} \text{ V}^{-1}$ ,  $V_{A1}=50 \text{ V}$  and  $V_{A2}= 35 \text{ V}$ , for Si-based devices.

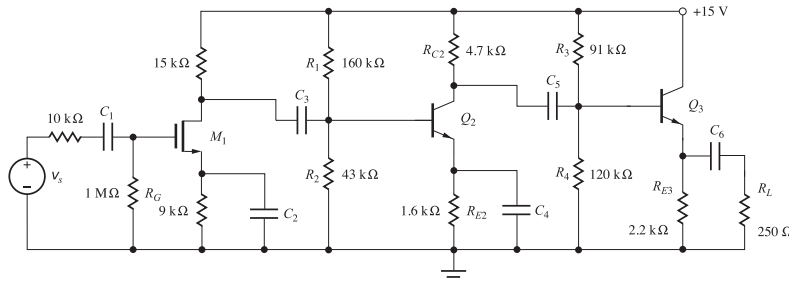


Figure 1: Sexy amplifier array

2. Find the midband voltage gain and input resistance of the amplifier in Fig. 2 if capacitors  $C_2$  and  $C_4$  are removed from the circuit. Considering a  $\beta_1=87$ ,  $\beta_2=13$ ,  $K_n = 0.9 \text{ A/V}^2$ ,  $T_{TN}=-12 \text{ V}$ ,  $\lambda = 0.007 \text{ V}^{-1}$ ,  $V_{A1}=4 \text{ V}$  and  $V_{A2}= 42 \text{ V}$ , for Si-based devices

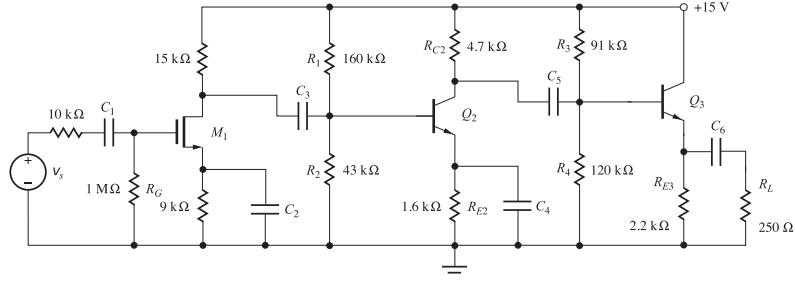


Figure 2: Amplify array

3. What are the midband voltage gain, input and output resistance of the amplifier shown in Fig. 3, by considering  $\beta_1=300$  and  $\beta_2=42$  for Si-based devices.

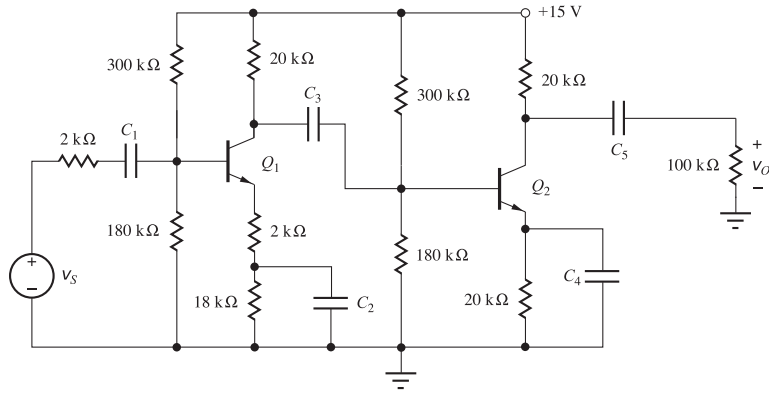


Figure 3: Amplify array