



Homework Assignment # 10, Due Friday April 6th, 2000

Short and Quick Problem set 35% of normal

8.1) Common Emitter Amplifier – Improvement and two-port model

The common-emitter bipolar transistor amplifier in the Second Midterm Problem II can be improved as shown in Figure E8.16 pp. 534 by replacing R_C by a current source and by going to dual power supplies (-2.5 V to 2.5V). The former makes R_C larger (as r_{oc} the resistance of the current source) and the latter eliminates the quiescent current through R_L . The source resistance is to be reduced from 200k Ω to 25 k Ω for both the original and the new circuit.

- Use $I_S = 10^{-16}$ A instead of $V_{BE} = 0.7$ V to find the input bias voltage for the exam and improved circuits.
- Using the small signal model find R_{in} , R_{out} , the voltage gain and G_m in the two-port model in Figure 8.2 for both the exam and improved circuits.
- Find the overall voltage gain of the circuit with R_S and R_L present for the exam and the improved circuits.
- For the exam and the improved circuit find the output voltage swings positive and negative at which the circuit will clip the input signal. (The IC current source has zero current whenever the voltage is above the supply voltage.)

