

King Fahd University of Petroleum and Minerals
Electrical Engineering Department

EE203 Electronics I
Exam # II

Name:	I.D#	No.	Sec.#
-------	------	-----	-------

All questions have equal marks.

Show all your work.

Question No.1

For the circuit in Figure 1, the transistor has $\beta=100$, $R_C=R_E=1\text{k}\Omega$. Perform DC analysis to find I_C and confirm that the transistor is working in active mode. Find the small signal voltage gain $A_V=v_o/v_s$ and the input resistance seen by the signal source v_s .

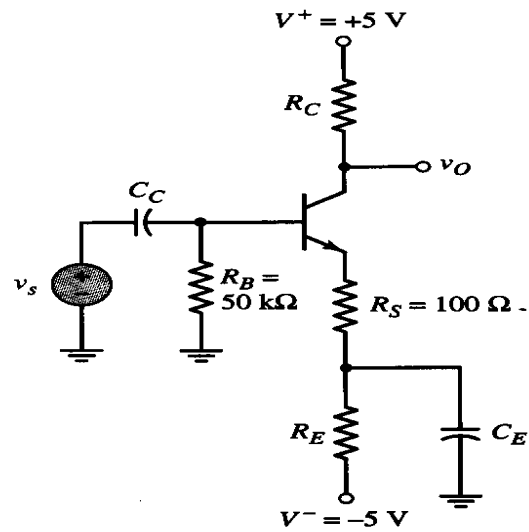


Figure 1

Question No. 2

The transistor in the circuit in Figure 2 has parameters $V_{TN}=1\text{V}$, $K_n=1\text{mA/V}^2$, and $\lambda=0$. The circuit parameters are $V_{DD}=5\text{V}$ and $R_i=300\text{k}\Omega$.

(a) Design the circuit such that $I_D=1.7\text{mA}$ and $V_{DS}=3\text{V}$.

(b) Determine the small signal voltage gain $A_v=v_o/v_i$ and the output resistance R_o .

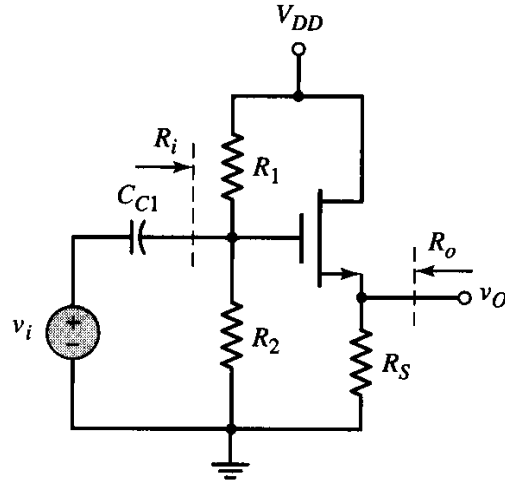


Figure 2

Question No. 3

Consider the ECL circuit in Figure 3. The input voltages A and B are compatible with the output voltages v_{o1} and v_{o2} . (Assume a transistor in active mode when it is ON and neglect the base current)

- Determine the reference voltage V_R .
- Determine the logic 0 and logic 1 levels at the outputs v_{o1} and v_{o2} .
- Determine the voltage V_E for A=B=logic 0 and for A=B=logic 1.
- Design a circuit that can be used to implement the 1mA current sources.

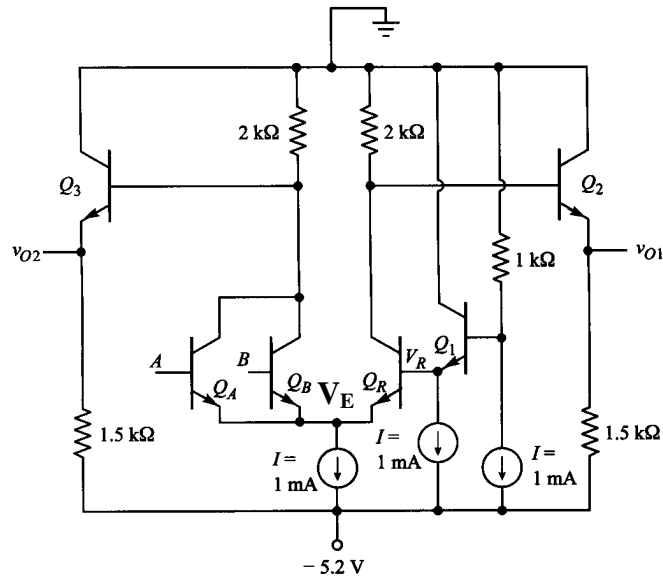


Figure 3