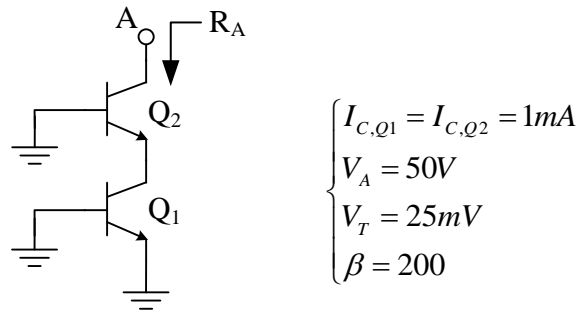
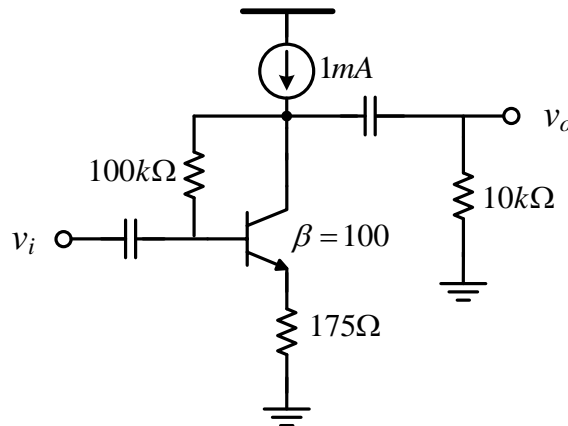


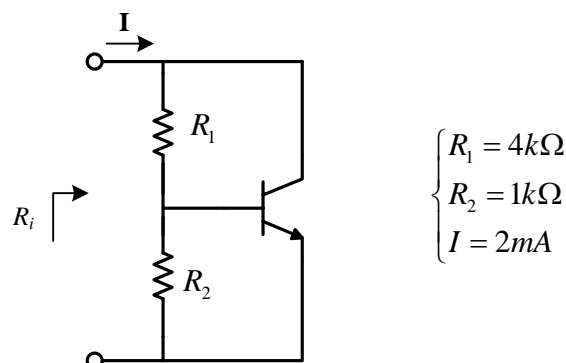
1. a) Draw the small-signal model of the following circuit and define a relation for the equivalent small-signal resistance seen from node A, R_A . The transistors are assumed to be in F.A. region.
- b) Estimate the value of R_A using the following parameters.



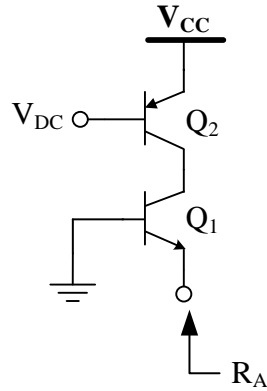
2. Draw the small-signal model of the following circuit and estimate the voltage gain of the amplifier ($A_v = v_o / v_i$).



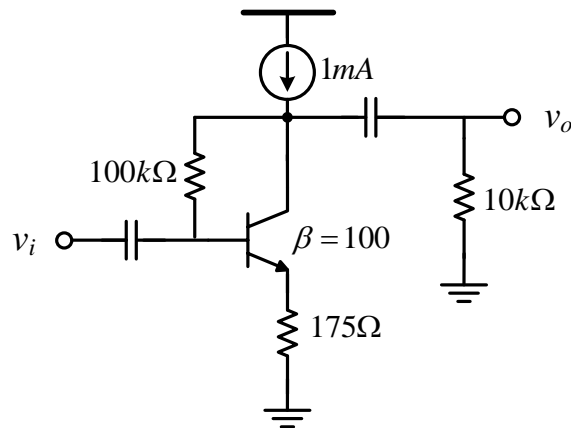
3. Determine the input resistance of the following circuit. Consider I as the input DC current. Suppose $\beta \gg 1$. (Hint: use small-signal model)



4. a) Draw the small-signal model of the following circuit and define a relation for the equivalent small-signal resistance seen from node A, R_A . The transistors are assumed to be in F.A. region.
- b) Assume large β and identical V_A for the transistors, simplify the relation which is obtained in part (a). You can use reasonable approximations.



5. Determine the small-signal output resistance of the following circuit seen from v_o . Suppose v_i is an small-signal voltage source.



Good luck – M.R. Ashraf