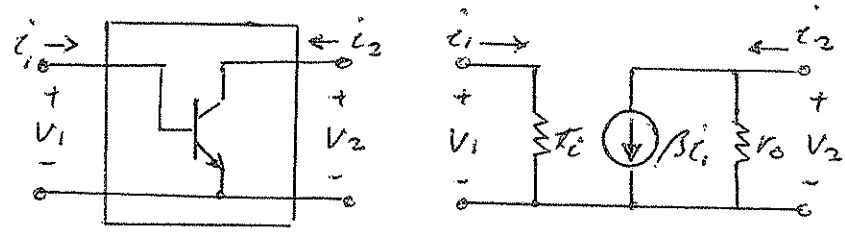
BJT Small Signal Models (forward active mode)

Common-Emitter Config.



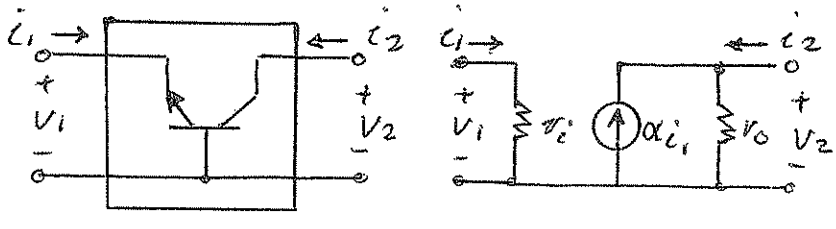
$$g_m = \frac{I_{CQ}}{nV_T}$$

$$r_i = \beta \frac{nV_T}{I_{CQ}}$$

$$r_o = \frac{V_A}{I_{CQ}}$$

$$\beta i_1 = g_m V_1$$

Common-Base Config.



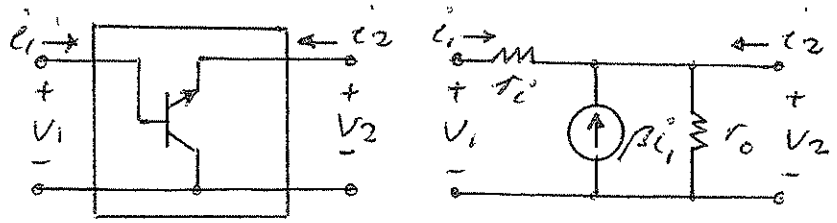
$$\alpha = \frac{\beta}{\beta+1}, \quad g_m = \frac{I_{CQ}}{nV_T}$$

$$r_i = \alpha \frac{nV_T}{I_{CQ}}$$

$$r_o = \frac{V_A}{(1-\alpha) I_{CQ}}$$

$$\alpha i_1 = g_m V_1$$

Common-Collector Config.



$$V_i = r_i i_1 \quad g_m = \frac{I_{CQ}}{nV_T}$$

$$r_i = \beta \frac{nV_T}{I_{CQ}}$$

$$r_o = \frac{V_A}{I_{CQ}}$$

$$\beta i_1 = g_m V_i$$