

BJT Configuration

Common Emitter Fixed Bias

$$Z_i = R_B \parallel B r_e$$

$$Z_i \approx B r_e$$

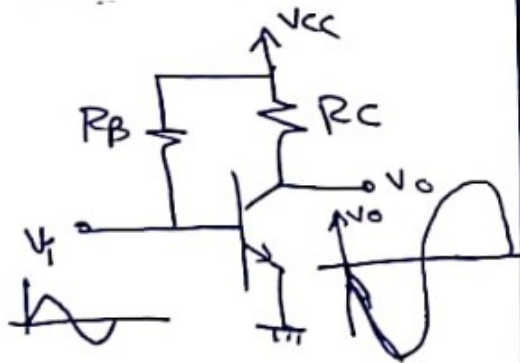
$$R_B \gg 10 B r_e$$

$$Z_o \approx R_C$$

$$A_v = \frac{V_o}{V_i} = -\frac{R_C}{r_o}$$

$$A_i \approx \beta$$

$$\text{or } A_i = -A_v \frac{Z_i}{R_C}$$



Voltage divider Bias

$$R' = \frac{R_1 R_2}{R_1 + R_2}$$

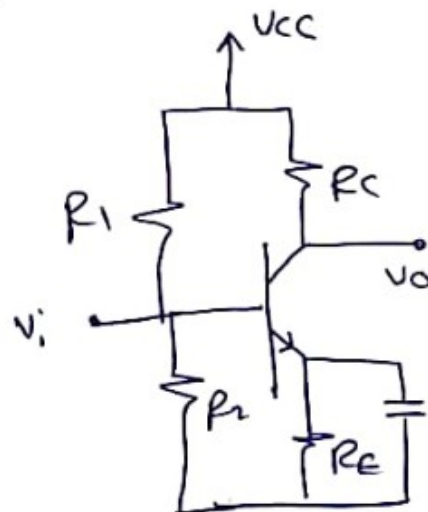
$$Z_i = R' \parallel B r_e$$

$$Z_o = R_C$$

$$A_v = -\frac{R_C \parallel r_o}{r_e} \approx -\frac{R_C}{r_e}$$

$$A_i = \beta$$

$$\text{or } A_i = -A_v \frac{Z_i}{R_C}$$



Common Emitter Bias

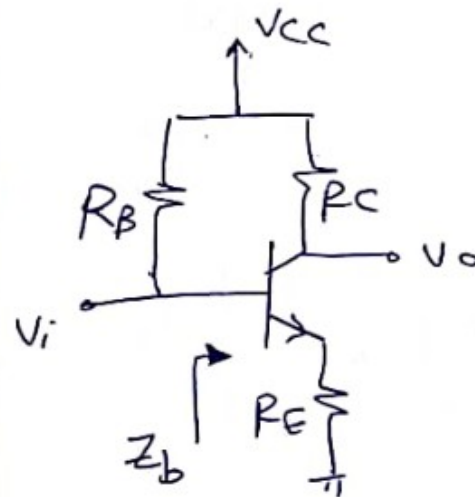
$$Z_b \approx B R_E$$

$$Z_i = R_B \parallel Z_b$$

$$Z_o = R_C$$

$$A_v = -\frac{R_C}{R_E}$$

$$A_i = \frac{\beta R_B}{R_B + Z_b}$$



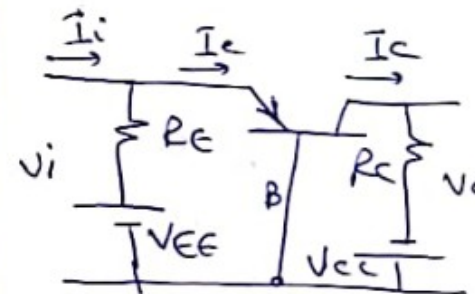
Common bias

$$Z_i = R_B \parallel r_e$$

$$Z_o = R_C$$

$$A_v \approx \frac{R_C}{r_e}$$

$$A_i \approx -1$$



$$r_e = \frac{26 \text{ mV}}{I_E}$$

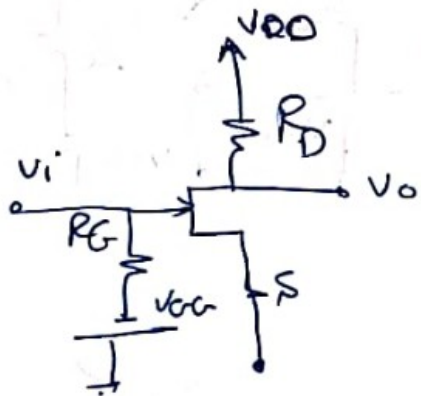
" JFET Configuration "

JFET Fixed Bias

$$Z_i = R_G$$

$$Z_o \cong R_D$$

$$A_v = -g_m R_D$$



$$g_m = \frac{2I_{DSS}}{|V_p|} \left[1 - \frac{V_{GS}}{V_p} \right]$$

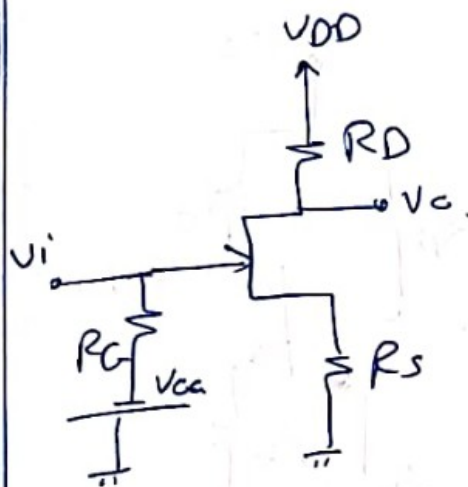
JFET Self Bias

un bypass capacitor

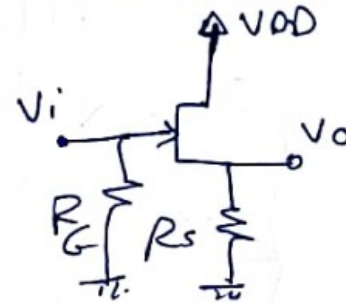
$$Z_i = R_G$$

$$Z_o = R_D$$

$$A_v = \frac{g_m R_D}{1 + g_m R_S}$$



JFET Source follower



$$Z_i = R_G$$

$$Z_o \cong R_S \parallel \frac{1}{g_m}$$

$$A_v \cong \frac{g_m R_S}{1 + g_m R_S} \text{ as } R_S \gg 10R_D$$

JFET Common Gate

$$Z_i \cong R_S \parallel \frac{1}{g_m}$$

as $r_d \gg 10R_D$

$$Z_o \cong R_D$$

$$A_v = g_m R_D$$

