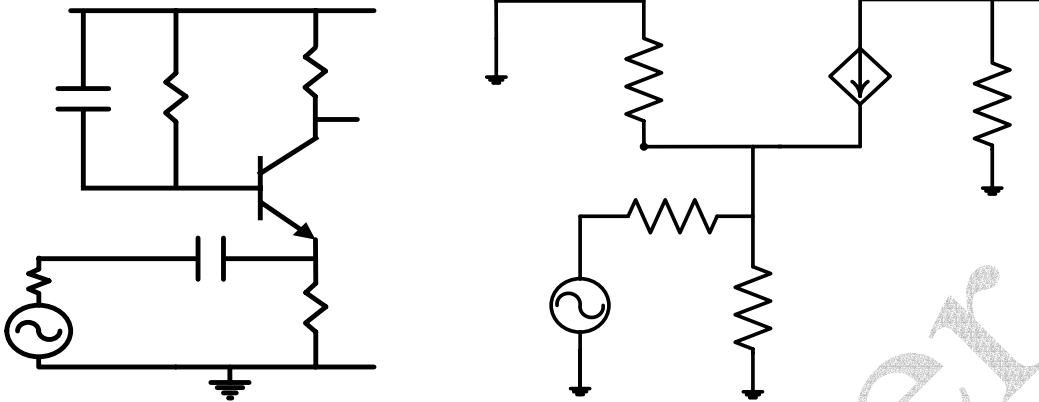


Analysis of common base amplifier:



1) Gain

$$v_o = -g_m v_{be} R_c$$

It is needed to find v_{be} in terms of v_s :

Applying inverse reflection rule:

By voltage division:

$$R = \frac{r_\pi}{1 + \beta}$$

$$v_{be} = - \frac{\left(\frac{r_\pi}{1 + \beta}\right) // R_E}{R_s + \left(\frac{r_\pi}{1 + \beta}\right) // R_E} v_s$$

$$\Rightarrow \frac{v_o}{v_s} = g_m \times R_c \frac{\left(\frac{r_\pi}{1 + \beta}\right) // R_E}{R_s + \left(\frac{r_\pi}{1 + \beta}\right) // R_E}$$

2) $R_{in} = R_E // \left(\frac{r_\pi}{1 + \beta}\right)$

3) R_o :

First, short circuit the input voltage source.

$$v_s = 0 \Rightarrow v_{be} = 0$$

The dependent current source $g_m v_{be}$ will be open circuit.

$$R_o = R_c$$

Vc

1M

Vs