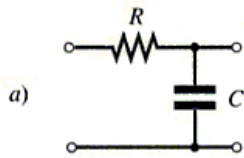


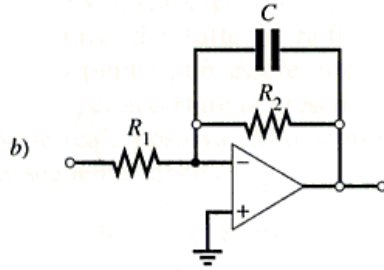
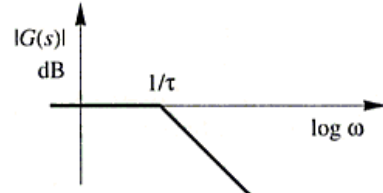
1. Compensazione con polo dominante

$$G(s) = \frac{K}{1+s\tau}$$



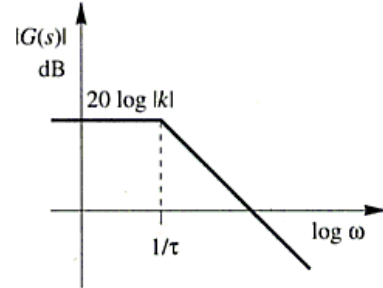
$$K = 1$$

$$\tau = RC$$



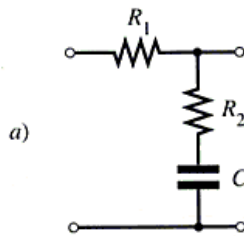
$$K = -\frac{R_2}{R_1}$$

$$\tau = R_2 C$$



2. Compensazione per ritardo di fase

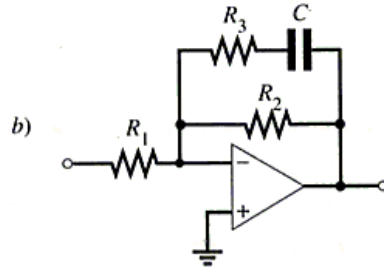
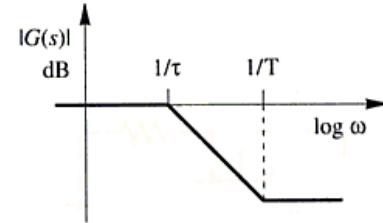
$$G(s) = K \frac{1+sT}{1+s\tau} \quad \tau > T$$



$$K = 1$$

$$T = R_2 C$$

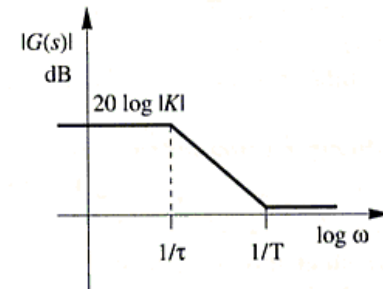
$$\tau = (R_1 + R_2) C$$



$$K = -\frac{R_2}{R_1}$$

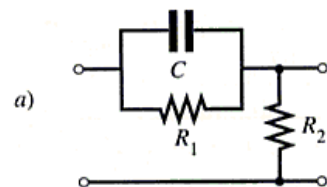
$$T = R_3 \cdot C$$

$$\tau = (R_3 + R_2) C$$



3. Compensazione per anticipo di fase

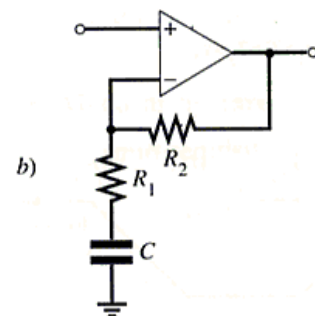
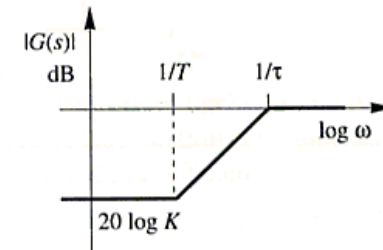
$$G(s) = K \frac{1+sT}{1+s\tau} \quad T > \tau$$



$$K = \frac{R_2}{R_1 + R_2}$$

$$T = R_1 C$$

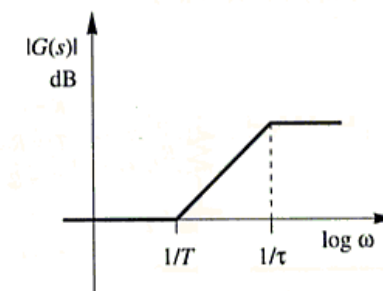
$$\tau = R_1 // R_2 C$$



$$K = 1$$

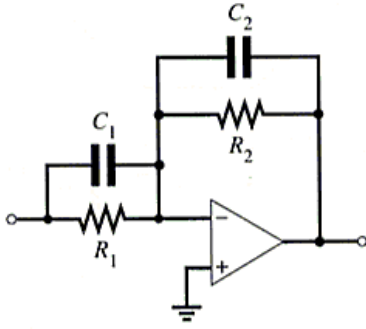
$$T = (R_1 + R_2) C$$

$$\tau = R_1 C$$



4. Compensazione per anticipo o ritardo di fase

$$G(s) = K \frac{1+sT}{1+s\tau}$$



$$K = -\frac{R_2}{R_1}$$

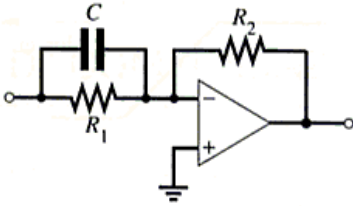
$$T = R_2 C_2$$

$$\tau = R_1 C_1$$

Diagramma di Bode
come 2 b) se $\tau > T$
come 3 b) se $T > \tau$
tenendo conto che $K \neq 1$

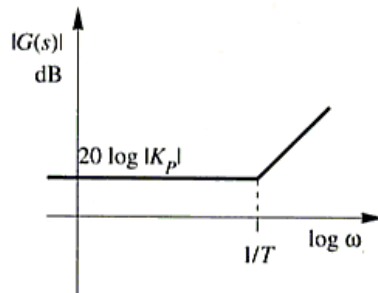
5. Compensazione proporzionale-derivativa

$$G(s) = K_p(1+sT)$$



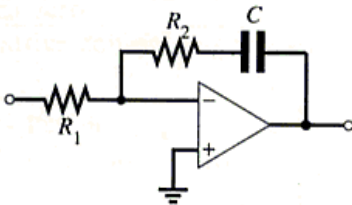
$$K_p = -\frac{R_2}{R_1}$$

$$T = R_1 C$$



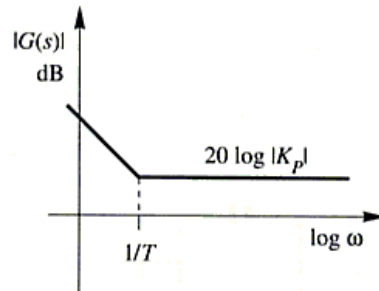
6. Compensazione proporzionale-integrale

$$G(s) = K_p \frac{1+sT}{sT}$$



$$K_p = -\frac{R_2}{R_1}$$

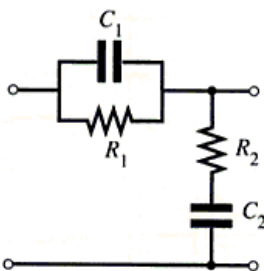
$$T = R_2 C$$



7. Compensazione con rete a sella

$$G_s = K \frac{(1+sT_1)(1+sT_2)}{(1+s\tau_1)(1+s\tau_2)}$$

$$\tau_1 > T_1 > T_2 > \tau_2$$



a)

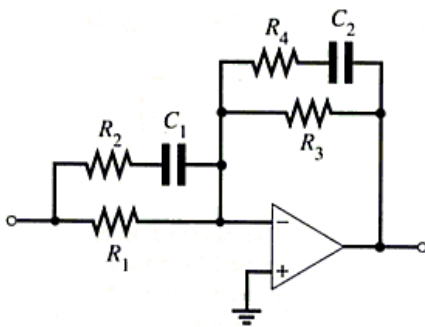
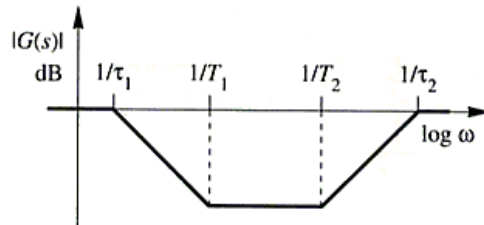
$$K = 1$$

$$T_1 = R_1 C_1$$

$$T_2 = R_2 C_2$$

$$\tau_1 \cdot \tau_2 = T_1 \cdot T_2$$

$$\tau_1 + \tau_2 = T_1 + T_2 + R_1 C_2$$



b)

$$K = -\frac{R_3}{R_1}$$

$$T_1 = (R_1 + R_2) C_1$$

$$T_2 = R_4 \cdot C_2$$

$$\tau_1 = (R_3 + R_4) C_2$$

$$\tau_2 = R_2 \cdot C_1$$

