UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO

FACULTAD DE INGENIERÍA

Trabajo: TAREA 16

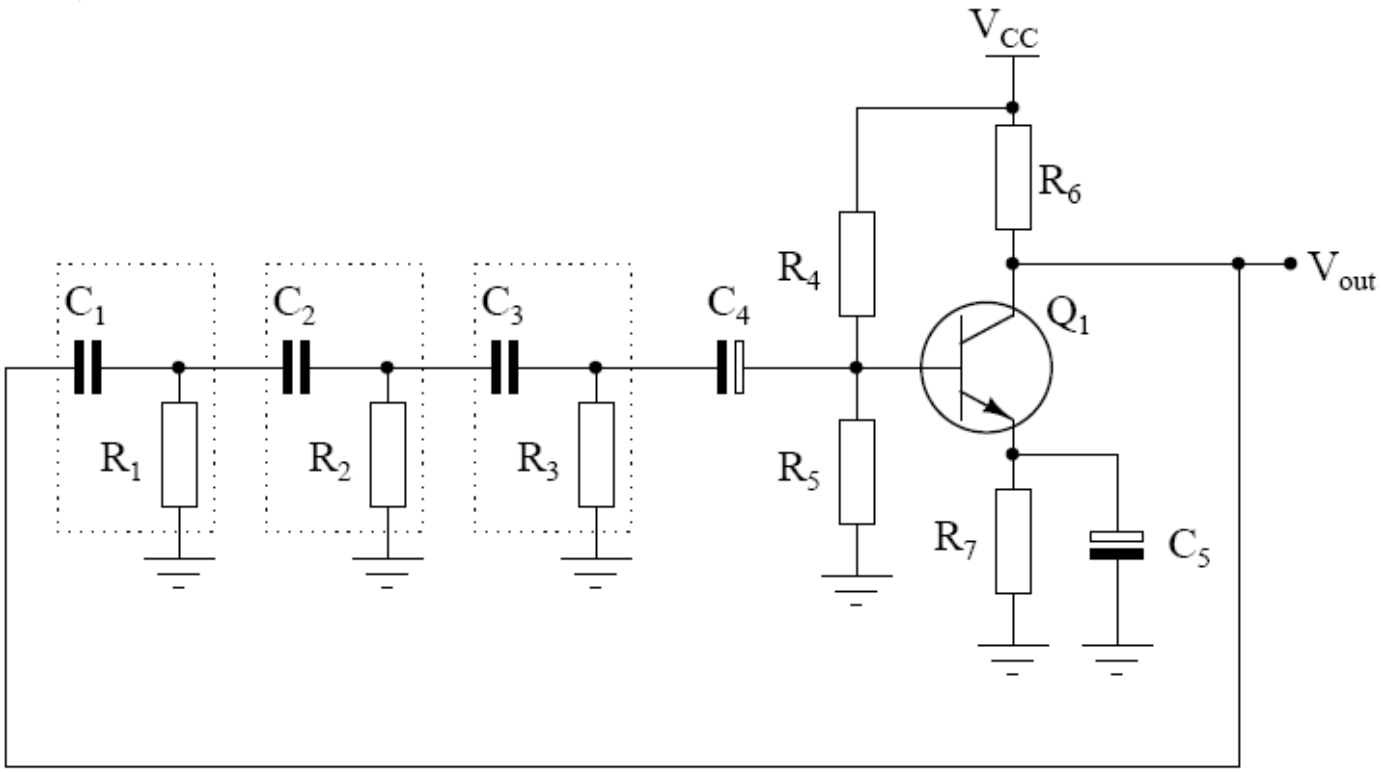
ALUMNO: SANTIAGO CRUZ PEDROS

ASIGNATURA: CIRCUITOS INTEGRADOS ANALÓGICOS

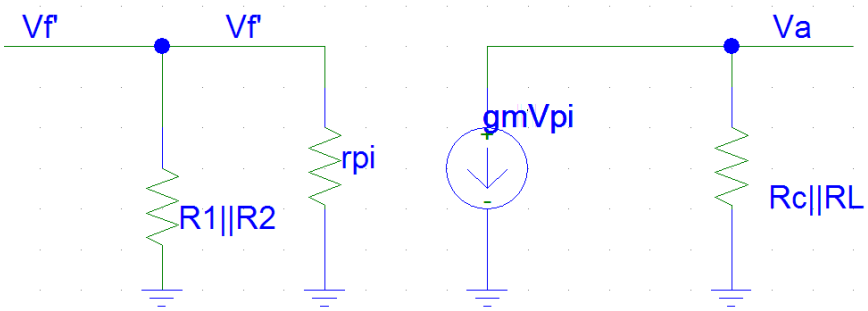
GRUPO: 1

sábado, 21 de octubre de 2017, Ciudad Universitaria, México, DF

TITULO:

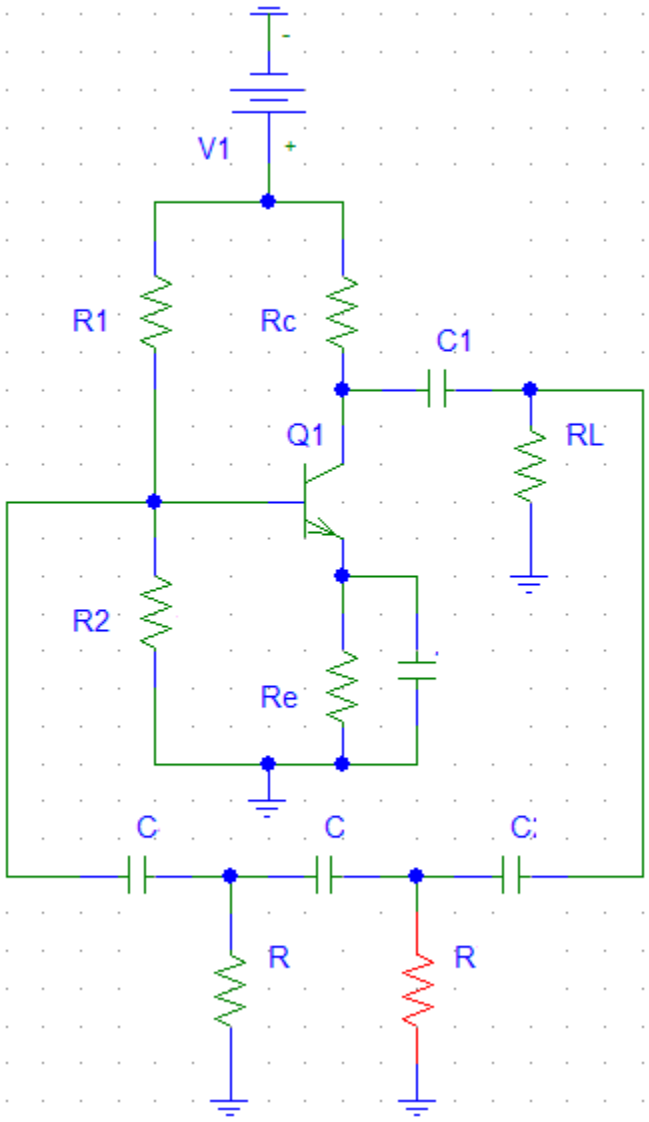


Identificar amplificación:



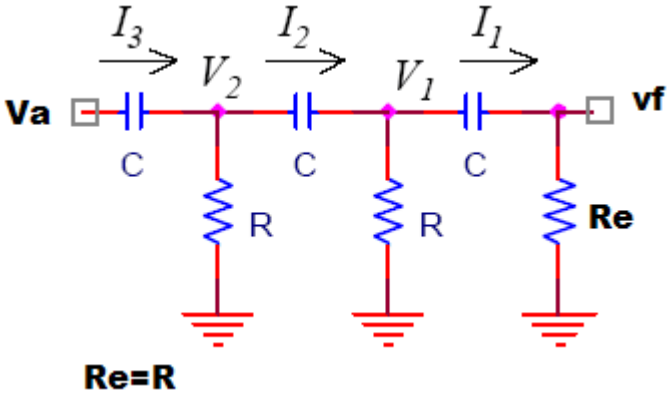
$$V_a = -g_m V_\pi \left(R_c \parallel R_L\right)$$
$$V_f' = V_\pi$$

$$\boxed{\frac{V_a}{V_f'} = -g_m \left(R_c \parallel R_L\right)}$$



$$R_{entrada} = (R_1 \| R_2) \| r_\pi$$

$$R_{entrada} = R$$



$$i_1 = \frac{v_f}{R_e}$$

$$V_1 = v_i + I_1 \frac{1}{sC} = \left(1 + \frac{1}{sR_eC}\right) v_f \text{ ----------(1)}$$

$$I_2 = \frac{v_1}{R} + I_1 = \left(1 + \frac{1}{sR_eC}\right)\frac{v_f}{R_e} + \frac{v_f}{R_e} = \left(2 + \frac{1}{sR_eC}\right)\frac{v_f}{R_e} \text{ ----------(2)}$$

$$I_3 = I_2 + \frac{V_2}{R_e} \text{ ----------(3)}$$

$$I_2 = I_1 + \frac{V_1}{R_e} \text{ ----------(4)}$$

$$\frac{v_f}{v_a} = \frac{1}{1 + \frac{6}{sRC} + \frac{5}{s^2R^2C^2} + \frac{1}{s^3R^3C^3}}$$

$$\boxed{\frac{v_f}{v_a} = \frac{R^3C^3s^3}{R^3C^3s^3 + 6R^2C^2s^2 + 5RCs + 1}}$$

$$\frac{v_f}{v_f'} = \frac{v_f}{v_a}\frac{v_a}{v_{f'}}$$

$$\frac{v_f}{v_f'} = -g_m\left(R_c \parallel R_L\right)\frac{R^3C^3s^3}{R^3C^3s^3 + 6R^2C^2s^2 + 5RCs + 1} = 1 + 0j$$

$$\frac{v_f}{v_f'} = -g_m\left(R_c \parallel R_L\right)\frac{R^3C^3(j\omega)^3}{R^3C^3(j\omega)^3 + 6R^2C^2(j\omega)^2 + 5RC(j\omega) + 1} = 1 + 0j$$

$$\frac{v_f}{v_f'} = -g_m\left(R_c \parallel R_L\right)\frac{-R^3C^3j\omega^3}{-R^3C^3j\omega - 6R^2C^2\omega^2 + 5RCj\omega + 1} = 1 + 0j$$

$$\frac{v_f}{v_f'} = g_m\left(R_c \parallel R_L\right)\frac{R^3C^3j\omega^3}{-R^3C^3j\omega - 6R^2C^2\omega^2 + 5RCj\omega + 1} = 1 + 0j$$

$$\frac{v_f}{v_f'} = g_m\left(R_c \parallel R_L\right)R^3C^3j\omega^3 = -R^3C^3j\omega - 6R^2C^2\omega^2 + 5RCj\omega + 1$$

$$0 = -6R^2C^2\omega^2 + 1$$

$$6R^2C^2\omega^2 = 1$$

$$\omega^2 = \frac{1}{6R^2C^2}$$

$$\omega = \frac{1}{\sqrt{6R^2C^2}}$$

$$\omega = \frac{1}{RC\sqrt{6}}$$

$$\boxed{f = \frac{1}{2\pi RC\sqrt{6}}}$$

$$g_m\left(R_c \parallel R_L\right)R^3C^3 j\omega^3 = -R^3C^3 j\omega + 5RCj\omega$$
$$\left(g_m\left(R_c \parallel R_L\right)R^3C^3\omega^3\right)j = -\omega j\left(R^3C^3 - 5RC\right)$$
$$\left(g_m\right) = \frac{-\left(R^3C^3 - 5RC\right)}{\left(R_c \parallel R_L\right)R^3C^3{\omega_0}^2}$$
$$\left(g_m\right) = \frac{-\left(R^3C^3 - 5RC\right)}{\left(R_c \parallel R_L\right)R^3C^3\left(\frac{1}{RC\sqrt{6}}\right)^2}$$

$$\left(g_m\right) = \frac{-\left(R^3C^3 - 5RC\right)}{\left(R_c \parallel R_L\right)R^3C^3\frac{1}{6R^2C^2}}$$
$$\left(g_m\right) = \frac{-\left(R^3C^3 - 5RC\right)}{\left(R_c \parallel R_L\right)RC\frac{1}{6}}$$
$$\left(g_m\right) = \frac{-RC\left(R^2C^2 - 5\right)}{\left(R_c \parallel R_L\right)RC\frac{1}{6}}$$
$$\left(g_m\right) = \frac{-\left(R^2C^2 - 5\right)}{\frac{\left(R_cR_L\right)}{\left(R_c + R_L\right)}\frac{1}{6}}$$
$$\left(g_m\right) = \frac{-6\left(R_c + R_L\right)\left(R^2C^2 - 5\right)}{\left(R_cR_L\right)}$$
$$\left(g_m\right) = \frac{-6\left(R_c + R_L\right)\left(R^2C^2 - 5\right)}{\left(R_cR_L\right)}$$

BIOGRAFIA:

PRAT VIÑAS Lluis, Circuitos y dispositivos electrónicos Fundamentos de electrónica Alfaomega 6ª Edición, México DF.
http://ieee.udistrital.edu.co/concurso/electronica2/realimentacion.htm