$$v_U(t) = \bar{V}_U + \tilde{v}_U(t) = \bar{V}_U + r(t)$$

$$\bar{V}_U = \frac{1}{T}\int_0^T v_U(t)\,dt$$

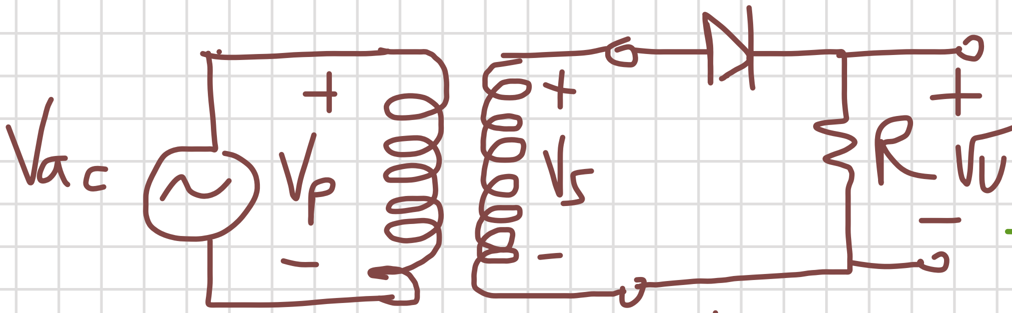
$$V_{Ueff} = \sqrt{\frac{1}{T}\int_0^T v_U^2(t)\,dt}$$

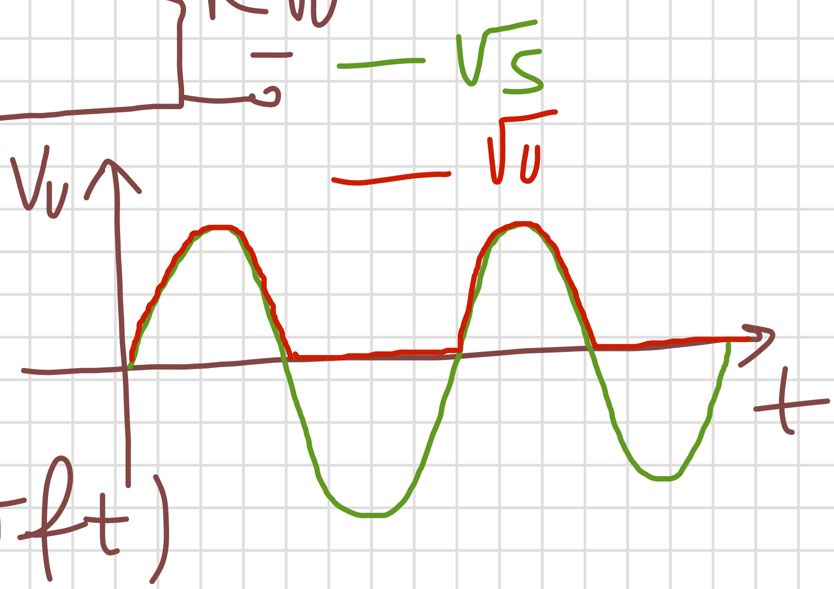
$$V_{Ueff}^2 = \frac{1}{T}\int_0^T [V_U + r(t)]^2\,dt = V_U + \frac{1}{T}\int_0^T r^2(t)\,dt =$$

$$= V_U^2 + R_{eff}^2$$

$$RF = \frac{R_{eff}}{V_U} = \frac{\sqrt{V_{Ueff}^2 - V_U^2}}{V_U}$$

$$\eta_R = \frac{\frac{V_U^2}{R}}{\frac{V_{Ueff}^2}{R}} = \frac{V_U^2}{V_{Ueff}^2}$$





$$\frac{V_P}{V_S} = \frac{N_P}{N_S}$$

$$v_S = V_m \sin(2\pi f t)$$

$$\bar{V}_U = \frac{V_m}{T}\int_0^{\frac{T}{2}} \sin(\omega t)\,dt = \frac{V_m}{\pi} = 0{,}32\,V_m$$

$$V_{Ueff} = V_m\sqrt{\frac{1}{T}\int_0^{\frac{T}{2}} \sin^2(\omega t)\,dt} =$$

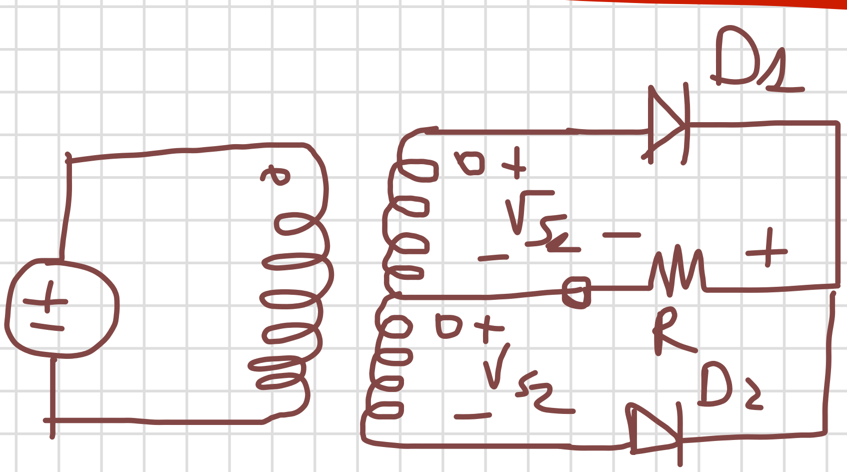
$$= V_m\sqrt{\frac{1}{2T}\int_0^{\frac{T}{2}} [1-\cos(2\omega t)]\,dt} =$$

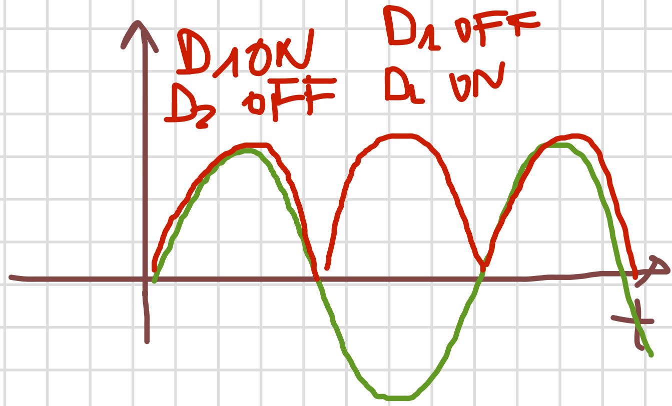
$$= \frac{V_m}{2}$$

$$\omega = 2\pi f$$

$$RF = \frac{\sqrt{V_{Ueff}^2 - \bar{V}_U^2}}{\bar{V}_U} = \sqrt{\frac{\pi^2}{4} - 1} = 1{,}211$$

$$\eta_R = \frac{\bar{V}_U^2}{V_{Ueff}^2} = \frac{4}{\pi^2} = 0{,}4053$$





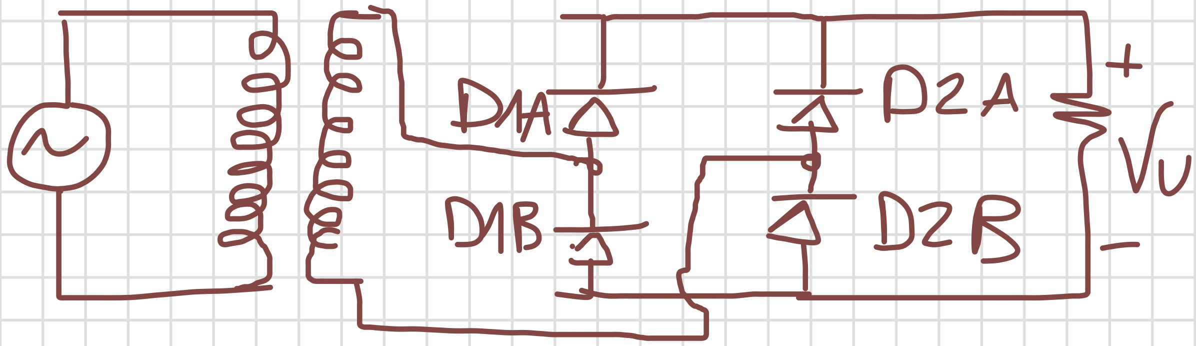
$$V_s = V_m \sin(\omega t)$$

$$V_U = V_m |\sin(\omega t)|$$

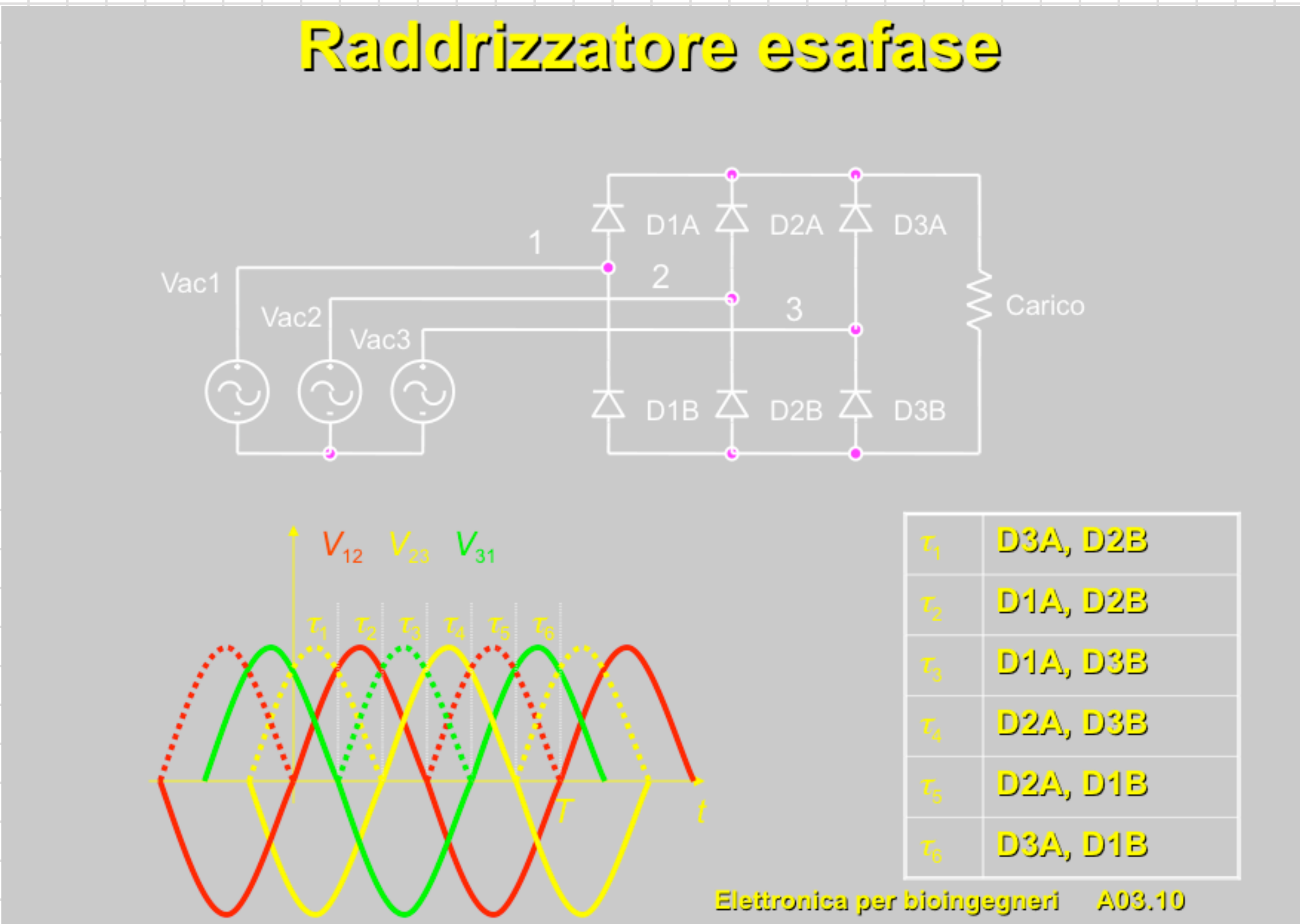
$V_U = 0,637\, V_m$; $V_{eff} = 0,7101\, V_m = \frac{V_m}{\sqrt{2}}$

$RF = 0,4834$; $\eta_R = \frac{8}{\pi^2} = 0,8106$

PONTE DI GRAETZ



$$V_U = V_m |\sin(\omega t)|$$

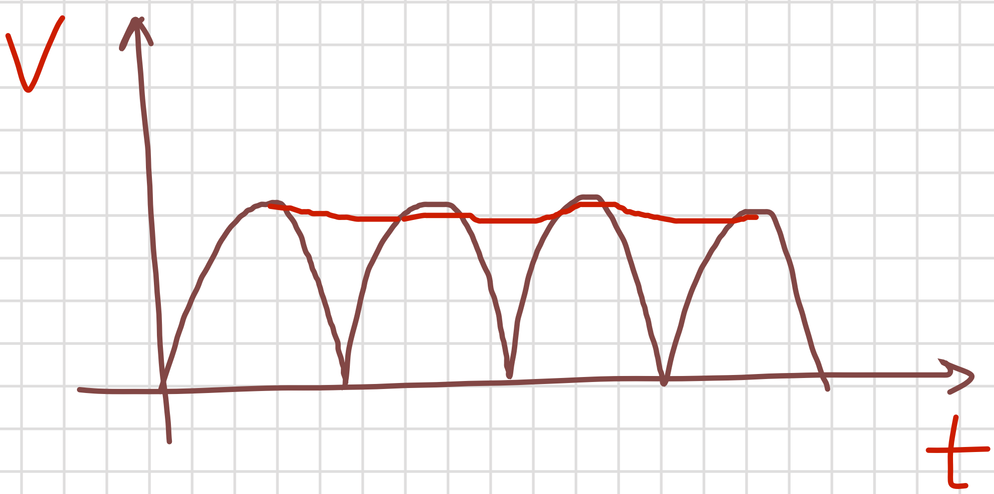


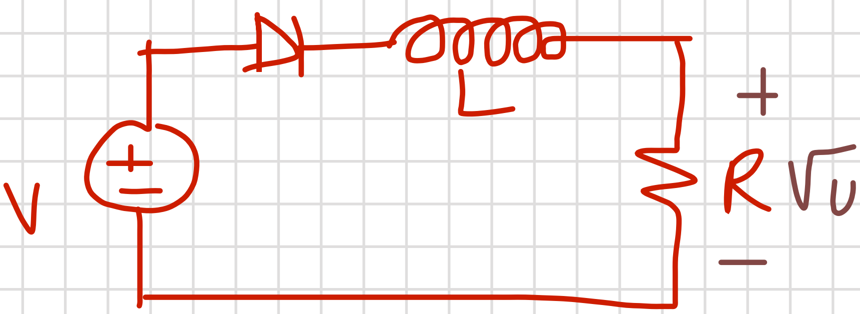
$$V_u = \frac{6V_M}{T}\int_{\frac{2T}{12}}^{\frac{4T}{12}} \sin(\omega t)dt = \frac{3V_M}{\pi}\left(\cos\left(\frac{\pi}{3}\right) - \cos\left(\frac{2\pi}{3}\right)\right) = \frac{3V_M}{\pi} = 0.9549 \cdot V_M$$

$$V_{Ueff} = V_M\sqrt{\frac{6}{T}\int_{\frac{2T}{12}}^{\frac{4T}{12}} \sin^2(\omega t)dt} = V_M\sqrt{\frac{3}{T}\int_{\frac{2T}{12}}^{\frac{4T}{12}} (1-\cos(2\omega t))dt} =$$

$$= V_M\sqrt{\frac{3}{T}\left(\frac{T}{6} + \frac{\sqrt{3}}{2\omega}\right)} = V_M\sqrt{\frac{1}{2} + \frac{3\sqrt{3}}{4\pi}} = 0.9958 \cdot V_M$$

$$RF = \frac{\sqrt{V_{Ueff}^{\,2} - V_u^{\,2}}}{V_u} = 0.04197 \qquad \eta_R = \frac{V_u^{\,2}}{V_{Ueff}^{\,2}} = 0.9982$$

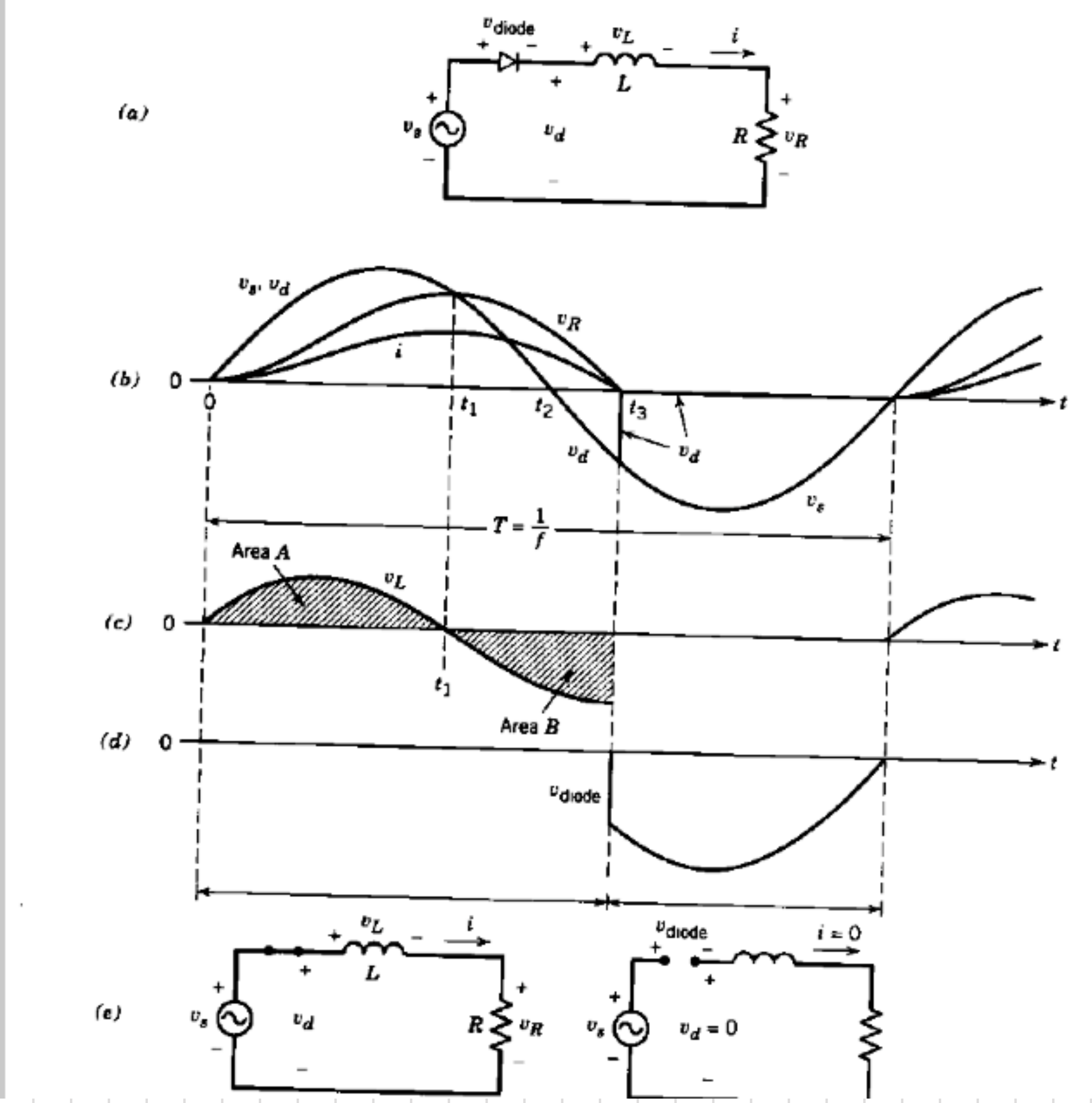


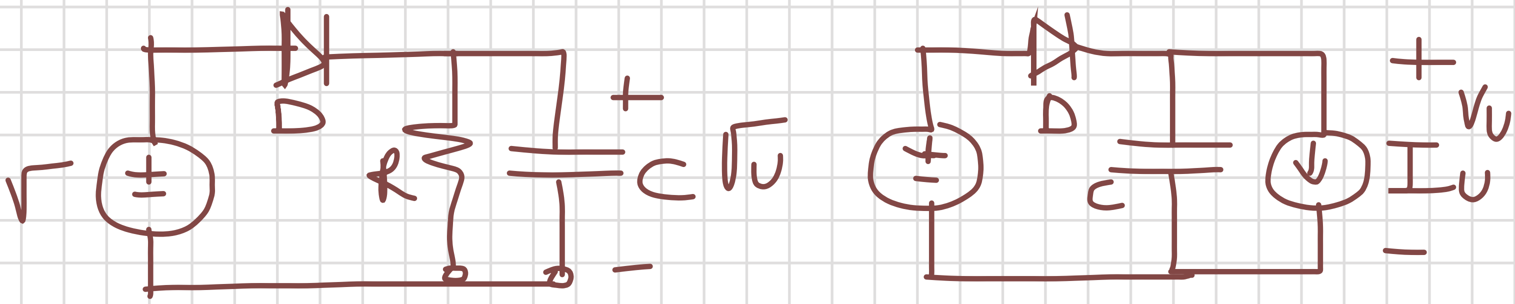


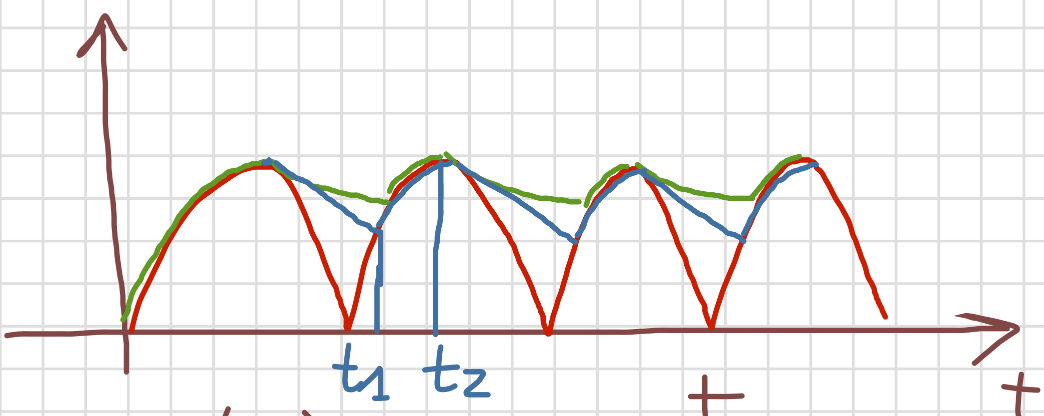
$$V = V_u + \frac{L}{R}\frac{dV_u}{dt}$$

$$V_u(j\omega) = V(j\omega)\frac{R}{R + j\omega L}$$

$$H(j\omega) = \frac{R}{R + j\omega L}$$

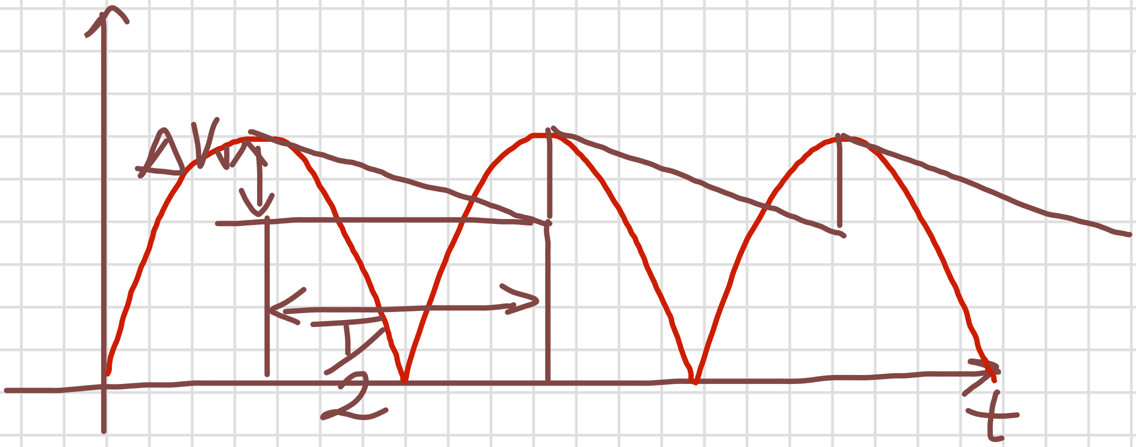






$$R : v_U(t) = V_m e^{-\frac{t}{\tau}}$$

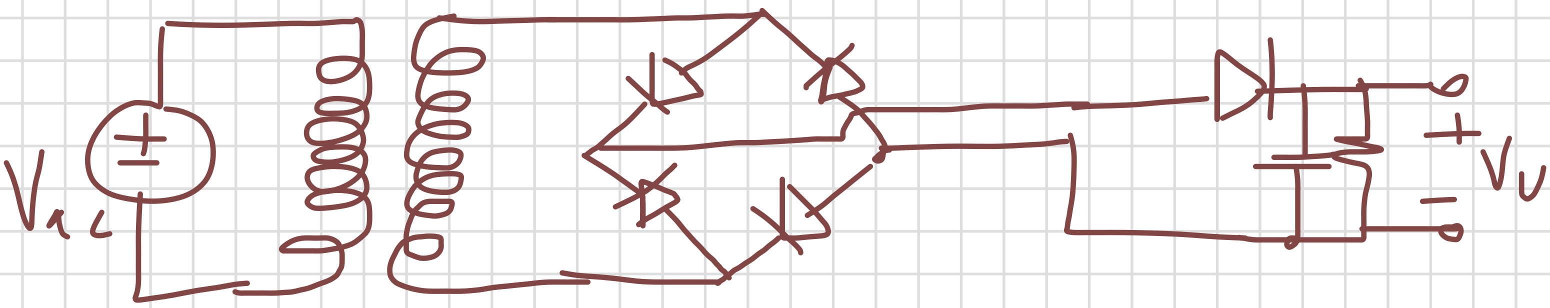
$$t_2 - t_1 \ll \frac{T}{2}$$



$$\Delta V_U = \frac{I_U T}{C\,2}$$

$$\Delta V_U = V_M\left(1 - e^{-\frac{t}{2RC}}\right)$$

$$\tau = RC$$

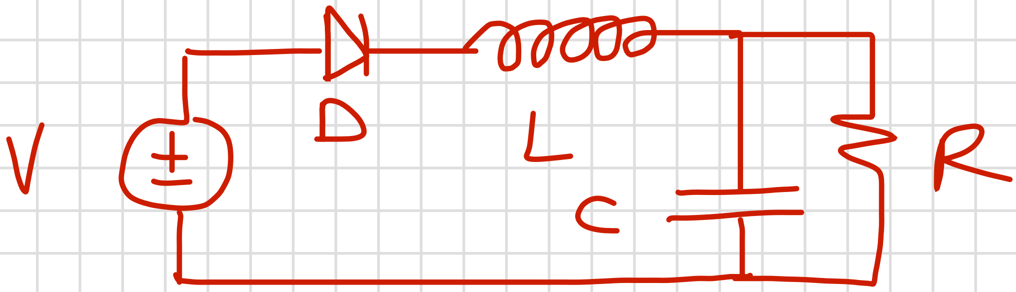


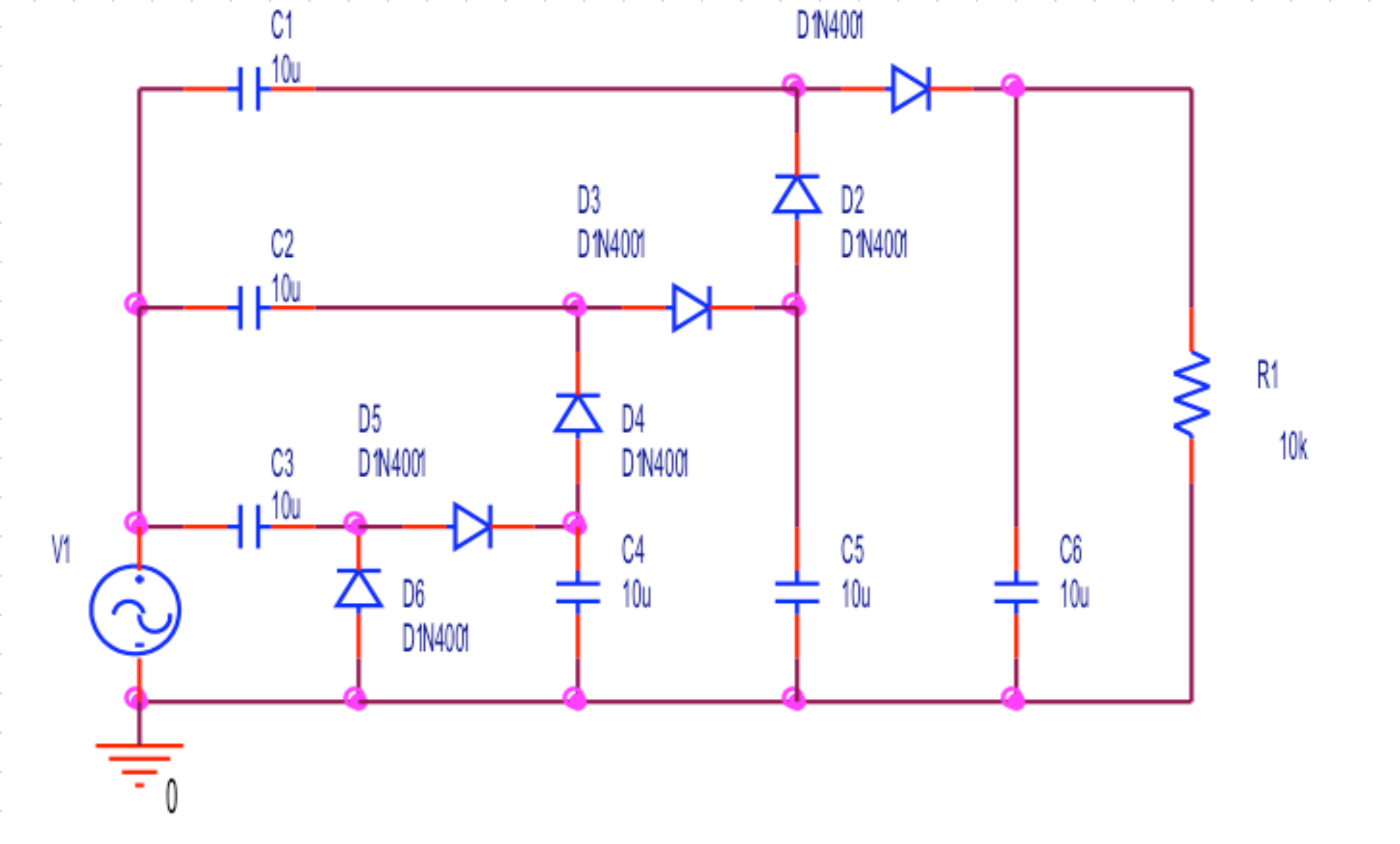
$$V_U = V_m - \frac{\Delta v_U}{2} = V_m - \left(\frac{T}{4C}\right) I_U = V_m - R_R I_U$$

$$V_{ueff} = \sqrt{\frac{2}{T}\int_0^{T/2}\left(V_m - \frac{I_U t}{C}\right)^2 dt} = \sqrt{\frac{2}{T}\int_0^{T/2}\left(V_m^{\ 2} - 2V_m\frac{I_U t}{C} + \frac{I_U^{\ 2} t^2}{C^2}\right)dt} =$$

$$= \sqrt{V_m^{\ 2} - 2V_m R_R I_U + \frac{4}{3}\left(R_R I_U\right)^2}$$

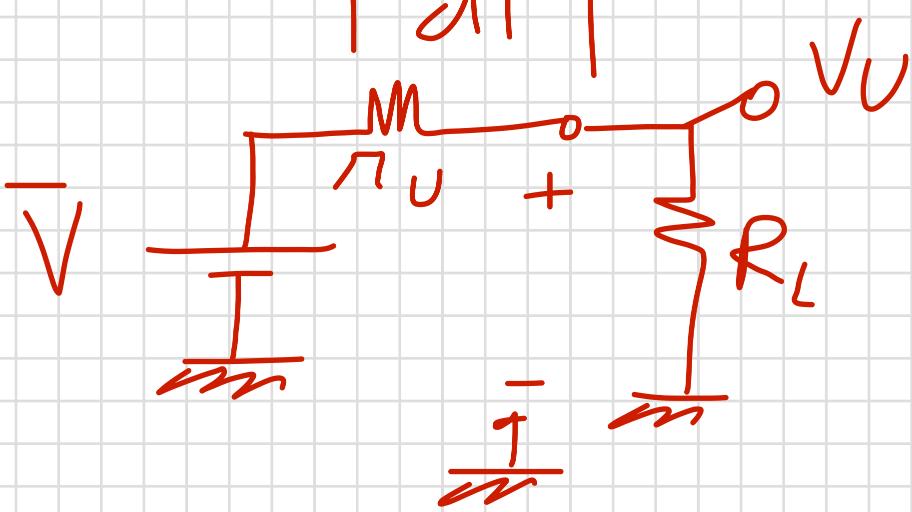
$$RF = \frac{\sqrt{V_{ueff}^{\ 2} - V_U^{\ 2}}}{V_U} = \frac{R_R I_U}{\sqrt{3}\left(V_m - R_R I_U\right)}$$



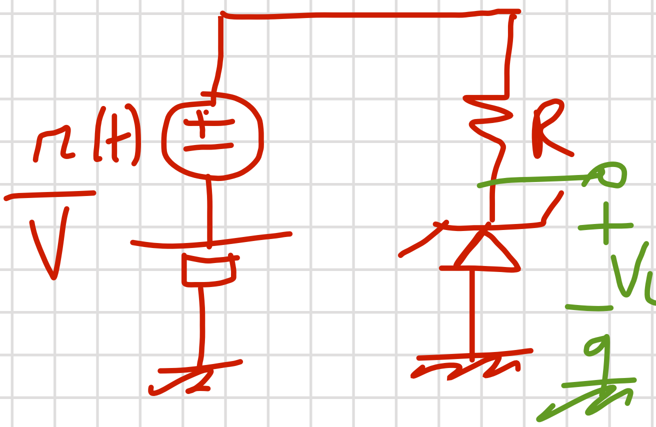


$$S_V = \left| \frac{dV_U}{dV_{IN}} \right| \qquad r_U = \left| \frac{dV_U}{di_U} \right|$$

$$S_T = \left| \frac{dV_U}{dT} \right|$$



$$V_U = \frac{R_L}{R_L + R_U} \overline{V}$$



r_Z è la resistenza dello zener

$$S_V = \frac{r_Z}{R + r_Z} \qquad r_U = R \,//\, r_Z$$