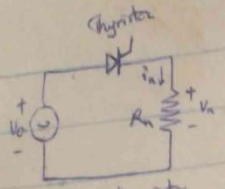


α = firing angle

Half wave thyristor with resistance load

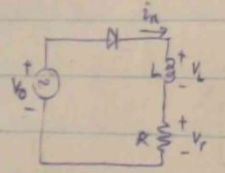
$$V_n = \frac{1}{2\pi}\int_{\alpha}^{\pi} v_n \, d(\omega t)$$

$$= 0.225\, V_o\,(1+\cos\alpha)$$

$$I_n = \frac{V_o}{R_n}\left[\frac{1}{\pi}\left[\frac{\omega t}{2} + \frac{\sin 2\omega t}{4}\right]_{\alpha}^{\pi}\right]^{1/2}$$

$$= \frac{V_o}{R_n}\left[\frac{1}{2} - \frac{\alpha}{2\pi} - \frac{\sin 2\alpha}{4}\right]^{1/2}$$

3.2 Single phase rectifier reactive load



β = extinction angle

Half wave ckt with RL load

$$i_1(t) = \frac{\sqrt{2}\,V_o}{(R^2+X^2)^{1/2}}\sin(\omega t - \phi)$$

$$\phi = \tan^{-1}\frac{X}{R} \qquad X = \omega L$$

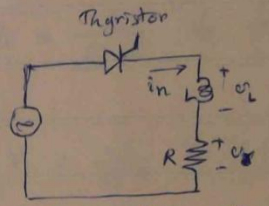
$$i_2(t) = -I_1(0)\, e^{-t/\tau}$$

$$\tau = \frac{L}{R}$$

$$i_1(\omega) = \frac{\sqrt{2}\,V_o}{(R^2+X^2)^{1/2}}\sin(-\phi)$$

$$i_n(t) = i_1(t) + i_2(t)$$

$$I_n = \frac{1}{2\pi R}\int_0^{\beta} \sqrt{2}\,V_o \sin\omega t \; d(\omega t)$$



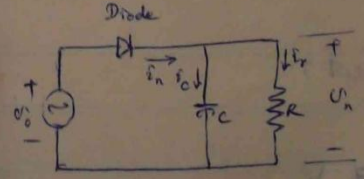
Controlled rectifier with RL load

$$i_1(t) = \frac{\sqrt{2}\,V_o}{(R^2+X^2)^{1/2}}\sin(\omega t - \phi) \qquad \phi = \tan^{-1}\frac{X}{R}$$

$$i_2(t) = -i_1(\alpha)\, e^{-t/\tau}$$

$$i_1(\alpha) = \frac{\sqrt{2}\,V_o}{(R^2+X^2)^{1/2}}\sin(\alpha - \phi)$$

$$I_n = \frac{1}{2\pi R}\int_{\alpha}^{\beta} \sqrt{2}\,V_o \sin\omega t \; d(\omega t)$$



Half-wave rectifier with parallel RC load