

Given $V_d = 300V$

$$R = 3\Omega$$

$$L = 40\mu H$$

$$C = 5\mu F$$

$$f_0 = 8\text{ KHz} \quad T = \left(\frac{1}{f_0}\right) = \frac{1}{8 \times 10^3}$$

$$(a) \quad t_q = \left(\frac{T}{2} - \frac{\pi}{\omega_r}\right)$$

$$\omega_r = \sqrt{\omega_0^2 - \delta^2}$$

$$= \sqrt{\frac{1}{LC} - \left(\frac{R}{2L}\right)^2}$$

$$= \sqrt{\frac{10^{12}}{200} - \left(\frac{3 \times 10^6}{80}\right)^2}$$

$$= \sqrt{0.005 \times 10^{12} - 0.00140625 \times 10^{12}}$$

$$= 0.59947 \times 10^6$$

$$\approx 0.6 \times 10^6$$

$$t_q = \frac{1}{16 \times 10^3} - \frac{\pi}{0.6 \times 10^6}$$

$$= (0.0625 - 0.00523598) \text{ msec.}$$

$$= 0.057264 \text{ msec.}$$

$$= \underline{\underline{57.26 \mu\text{sec.}}}$$

(b.)

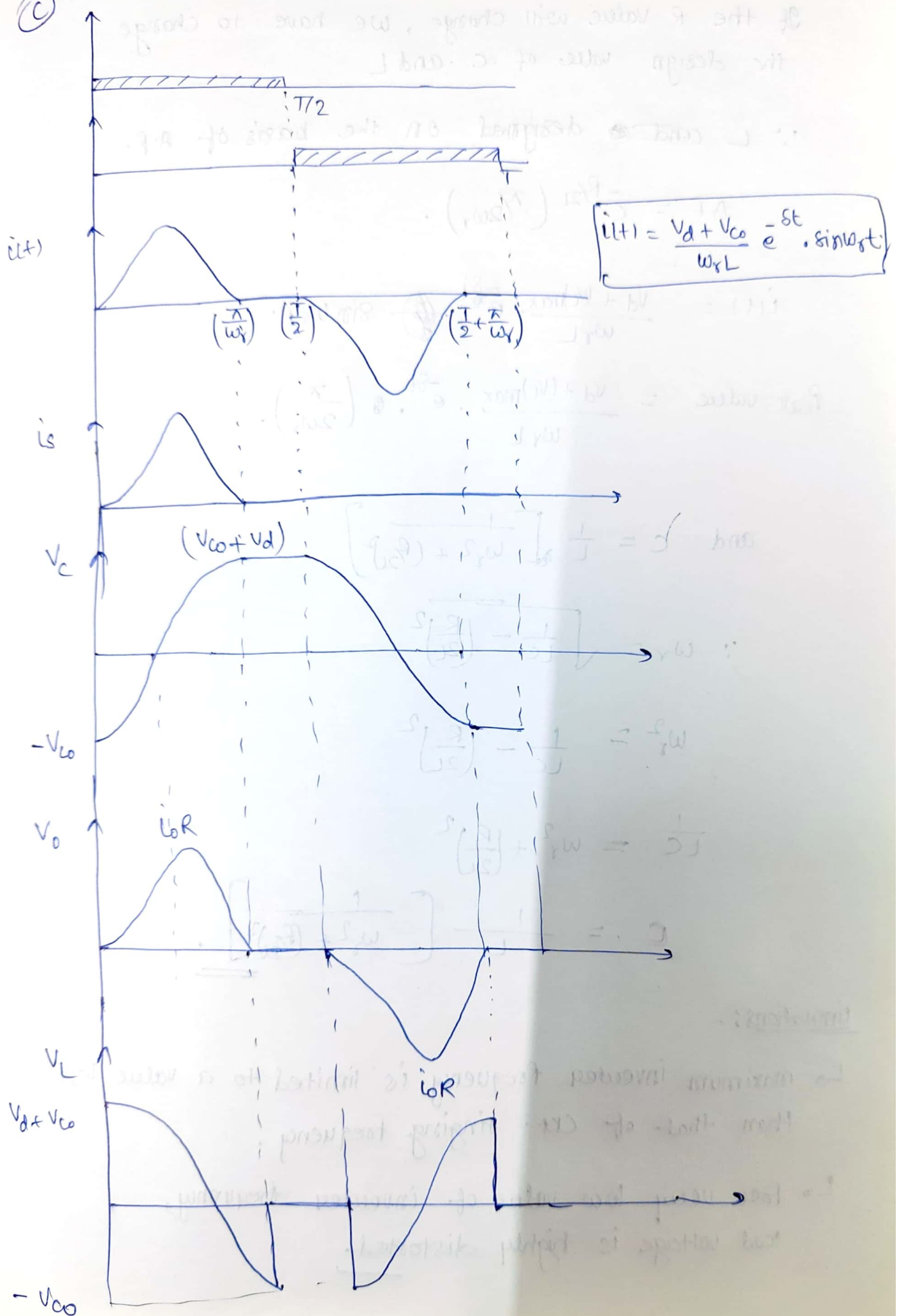
$$\text{Peak thy. voltage} = V_d + V_{co}$$

$$V_{co} = 2 \sqrt{\left(\frac{L}{C}\right)} \cdot I_{dc}$$

Peak value of current through thy.

$$= \left(\frac{V_d + (V_c)_{\max}}{\omega \times L} \right)$$

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If the R value will change, we have to change the design value of C and L .

$\therefore L$ ~~and~~ designed on the basis of A.F.

$$A_f = e^{-R/2L} \left(\frac{\pi}{2\omega_r} \right).$$

$$i(t) = \frac{V_d + (V_c)_{\max}}{\omega_r L} \cdot e^{-\frac{R}{2L}t} \cdot \sin \omega_r t.$$

$$\text{Peak value} = \frac{V_d + (V_c)_{\max}}{\omega_r L} \cdot e^{-\frac{R}{2L}t} \cdot \left(\frac{\pi}{2\omega_r} \right).$$

$$\text{and } C = \frac{1}{L} \left[\frac{1}{\omega_r^2 + \left(\frac{R}{2L} \right)^2} \right]$$

$$\therefore \omega_r = \sqrt{\frac{1}{LC} - \left(\frac{R}{2L} \right)^2}$$

$$\omega_r^2 = \frac{1}{LC} - \left(\frac{R}{2L} \right)^2$$

$$\frac{1}{LC} = \omega_r^2 + \left(\frac{R}{2L} \right)^2$$

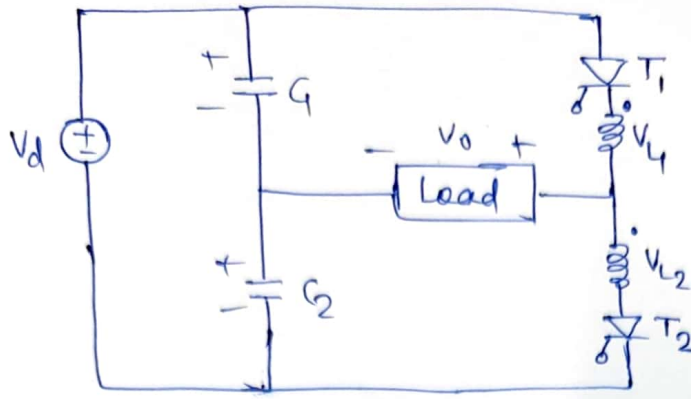
$$C = \frac{1}{L} \left[\frac{1}{\omega_r^2 + \left(\frac{R}{2L} \right)^2} \right].$$

Limitations:-

→ maximum inverter frequency is limited to a value less than that of ckt. ringing frequency.

→ for very low value of inverter frequency, load voltage is highly distorted.

modified series inverter



$$L_1 = L_2$$

$$C_1 = C_2$$

L_1 and L_2 are

lightly coupled.