(12)

3.) ~~$\bar{V}_{dqs} = V_{dq} e^{j\theta}$~~

$\Rightarrow$ ~~$\bar{V}_{dq} = \frac{\bar{V}_{as}}{e^{j\theta}}$~~ $\quad \theta = 2\pi 50$

~~$f_d = Re\left(\frac{\bar{f}}{e^{j\theta}}\right) \cdot e^{j\theta}$~~

$$f_d = Re\left(\frac{\bar{f}}{e^{j\theta}}\right) = Re\left(\frac{e^{-j\theta}}{e^{j\theta}}\right) = Re\left(e^{-j2\theta}\right)$$

$$= \cos(2\theta) = \cos(2\pi 100 t)$$

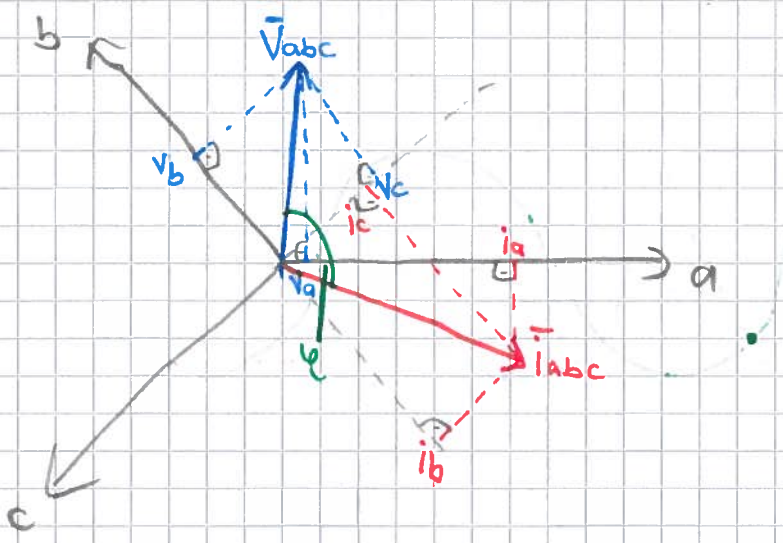
$$f_q = Re\left(\frac{\bar{f}}{e^{j(\theta+90^\circ)}}\right) = Re\left(\frac{e^{-j\theta}}{e^{j\theta} e^{j90^\circ}}\right) = Re\left(e^{-j(2\theta+90^\circ)}\right)$$

$$= \cos(2\theta + 90^\circ)$$

$$= -\sin(2\theta)$$

$$= -\sin(2\pi 100 t)$$

4.)



If current $i_a = I_{pk} \cos(\omega t - \varphi)$ and the parameters of the RL-circuit are identical, then:

$i_b = I_{pk} \cos(\omega t - \frac{2\pi}{3} - \varphi)$

$i_c = I_{pk} \cos(\omega t + \frac{2\pi}{3} - \varphi)$