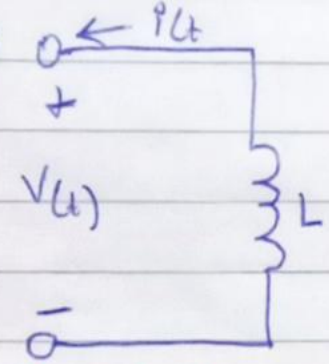
89 (i)



ACTIVE SIGN CONVENTION

$i(t) = I_m \cos(\omega t + \phi) = \text{Re of phasor} = I_m \angle 0$

$v(t) = -L \frac{di(t)}{dt}$

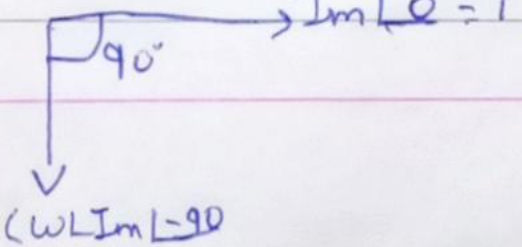
$= -L\omega I_m(-\sin(\omega t + \phi))$

$= I_m L\omega \sin(\omega t + \phi)$

$= I_m \omega \cos(-90 + (\omega t + \phi))$

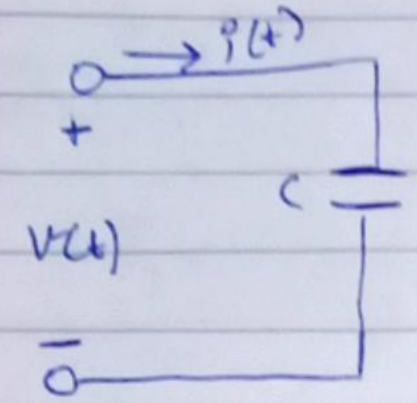
$= \omega L\, I_m \angle -90$

$\Rightarrow V_m = \omega L\, I_m \angle -90^\circ$



∴ Voltage lags by 90°

(ii)



PASSIVE SIGN CONVENTION

$i(t) = I_m \cos(\omega t + \phi) = I_m \angle 0$

$V(t) = \frac{1}{C}\int I_m \cos(\omega t + \phi)\, dt$

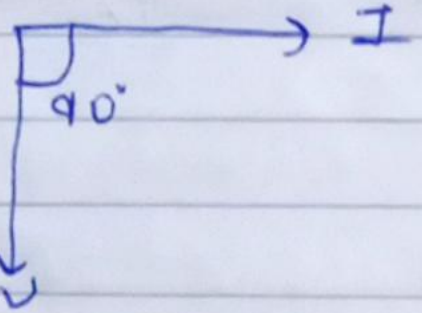
$= \frac{I_m}{C\omega} \sin(\omega t + \phi)$

$= \frac{I_m}{C\omega} \cos(\omega t + \phi - 90)$

$= \frac{I_m}{\omega C} 1\angle -90$

$V_m = \frac{1}{\omega C} I_m \angle -90$

Phasor:



Voltage lags by 90°