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BATCH : B10

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Date
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Electrical Science - I (15BI1EC111)

Tutorial - 7

Q.1. $V = 3\cos 4t + 4\sin 4t$

$V = 5\left\{\frac{3}{5}\cos 4t + \frac{4}{5}\sin 4t\right\} = 5\cos\{4t - 53.13^\circ\}$ Ans

Q.2. $i(t) = 2\cos(6t+120^\circ) + 4\sin(6t-60^\circ)$

$= 2\cos(6t+120^\circ) + 4\cos(6t-150^\circ)$

$= 2\angle 120^\circ + 4\angle -150^\circ$

$= 4.472\angle -176.56$

$= -4.464 - 0.20j$

$= 4.464\cos(6t-176.56^\circ)$

$= 4.464\sin(6t-86.56^\circ)$ Ans

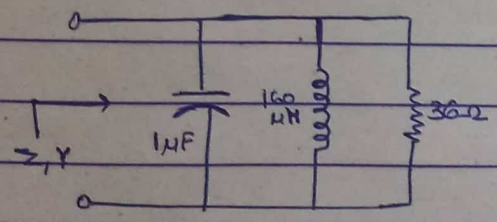
Q.3. $V = 3\cos 3t$

$i = -2\sin(3t+100^\circ)$

$i = 2\cos(3t+100+90^\circ) = 2\cos(3t+190^\circ)$

Hence current leads with voltage by 190°.

Q.4.



$\frac{1}{Z} = \frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3}$

$Y = Y_1 + Y_2 + Y_3$

$= j\omega C + \frac{1}{j\omega L} + \frac{1}{R}$

$= 0.062j - 0.099j + \frac{1}{36}$

$Y = -0.037j + 0.027$ Ans

$Z = 12.87 + 17.63j$ Ans

Q.5. $V_1 = 45\sin(\omega t + 30^\circ)$

$V_2 = 50\cos(\omega t - 30^\circ)$

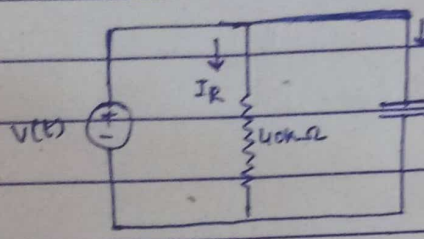
$V_1 = 45\cos(\omega t + 30 - 30^\circ)$

$= 45\cos(\omega t - 60^\circ)$

$\phi = 60^\circ - 30^\circ = 30^\circ$

therefore, the phase Angle between the two sinusoid is 30° & V_1 lags V_2

Q.60.



$I_R = \frac{V(t)}{R}$

$I_R = \frac{100\cos(60t + 20^\circ)}{40 \times 10^3} = 2.5 \times 10^{-3}\cos(60t + 20^\circ)$ A

$I_c = C\frac{dv(t)}{dt} = 50 \times 10^{-6} \cdot 100\sin(60t + 20^\circ) \cdot 60$

$I_c = 300\sin(60t + 20^\circ)$ mA