Name : Tanjim Reza

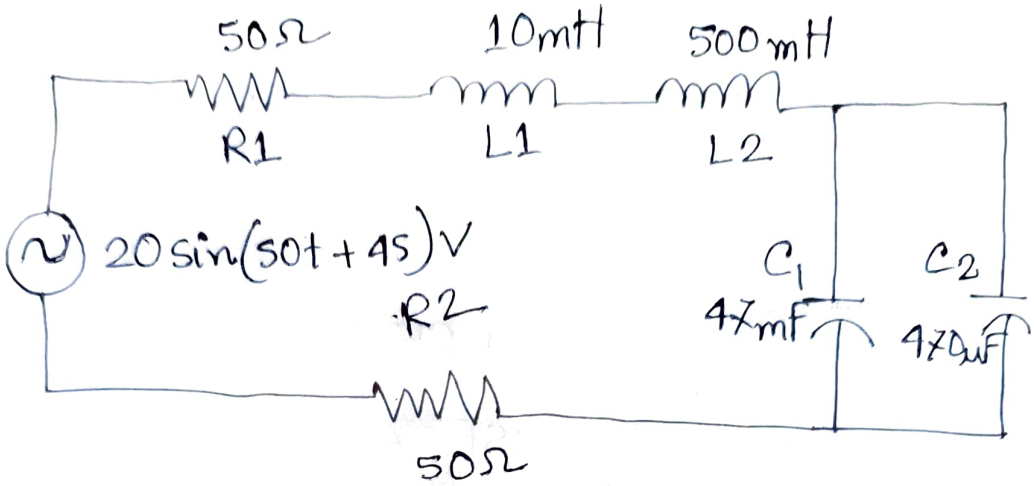
Student ID : 20101065

Course : CSE250

Section : CSE06

Assignment : 04 (Theory)

Ans: to the que no: 1 (a)



$V = 20 \sin(50t + 45)$

$\omega = 50$

$$\therefore \quad v(t) = 20 \sin(50t + 45^\circ - 90^\circ)$$

$$= 20 \cos(50t + 45^\circ - 90^\circ)$$

$$= 20 \cos(50t - 45^\circ)$$

$$= 20 \angle -45^\circ$$

Ans:

Ans: to the que no: 1(b)

Given

$L_2 = 500mH$

$\omega = 50$

$\therefore$ Impedence $= j\omega L_2$

$= 50 \times 500 \times 10^{-3} j$

$= 25j\ \Omega$ Ans:

Ans: to the que no: 1(c)

Given,

$C_1 = 47mf$; $C_2 = 470\ \mu f$

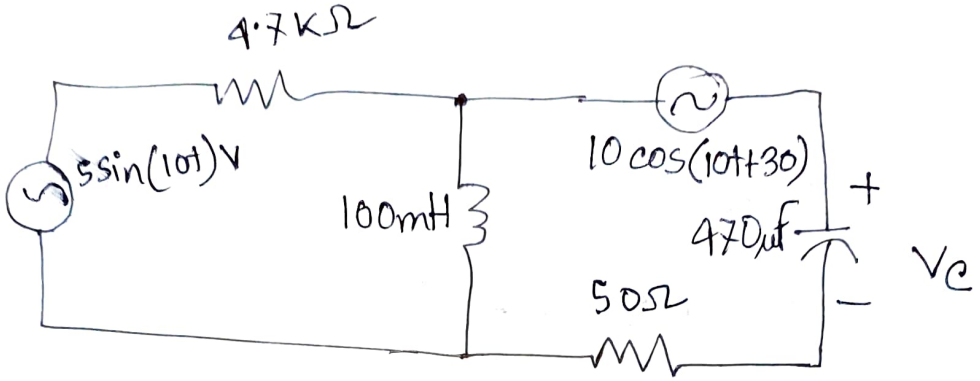
$\therefore$ Equivalent impedence of C_1 and C_2

$$C = \frac{C_1 C_2}{C_1 + C_2}$$

$$= \frac{\left(\frac{-j}{50 \times 47 \times 10^{-3}}\right)\left(\frac{-j}{50 \times 470 \times 10^{-6}}\right)}{\left(\frac{-j}{50 \times 47 \times 10^{-3}}\right) + \left(\frac{-j}{50 \times 470 \times 10^{-6}}\right)}$$

$= -0.421318276j$ Ans

Ans: to the que no: 2(a)



Given

$$V_1 = 5\sin(10t)\,V$$

$$= 5\angle -90^\circ\,V$$

$$V_2 = 10\cos(10t+30)$$

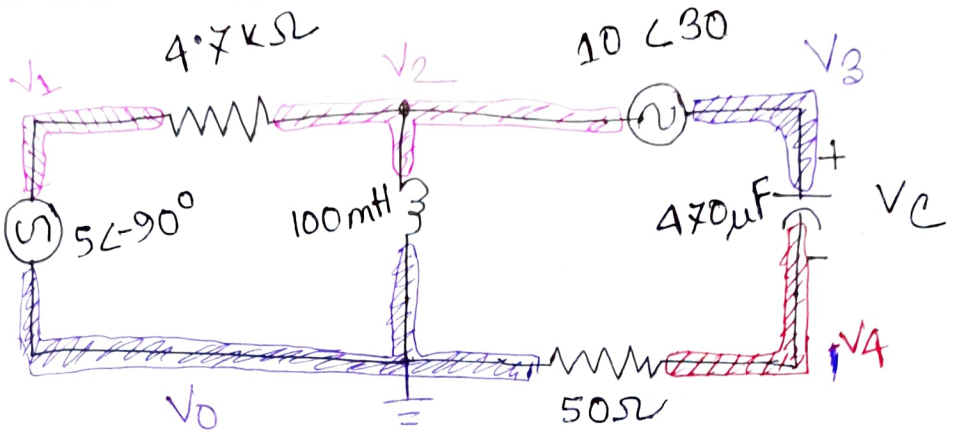
$$= 10\angle 30^\circ V$$

$$\omega = 10 \;;\; C = 470\times10^{-6}$$

$$\therefore j\omega t = j\times 10\times 100\times 10^{-3} = j1\,\Omega$$

$$\therefore \frac{-j}{\omega C} = \frac{-j}{10\times 470\times 10^{-6}}$$

$$= -j212.765957$$



$V_1 = 5\angle -90^\circ V = -5i$

$V_2 - V_3 = 10\angle 30^\circ V = 5\sqrt{3} + 5i$

Supernode V2, V3

$$V_2\left(\frac{1}{4700\Omega} + \frac{1}{1j\Omega}\right) - \frac{V_1}{4700} - \frac{V_0}{1^\circ} + V_3\left(\frac{1}{-j\,212.766}\right) - \frac{V_4}{-j\,212.766} = 0$$

Node V4:

$$V_4\left(\frac{1}{50}\right) + \frac{1}{-212.766j} - \frac{V_3}{-212.766j} = 0$$

Solving the equations

$V_1 = -5j$

$V_2 = -0.0429494 - 0.0132105j$

$V_3 = -8.70295 - 5.01321j$

$V_4 = 0.660981 - 2.20052j$

$\therefore V_c = V_3 - V_4$

$= (-8.70295 - 5.01321j) - (0.660981 - 2.20052j)$

$= -9.363931 - 2.812691^{\circ}$

$= 9.777240344 \angle -163.2810503^{\circ}$ V

Ans