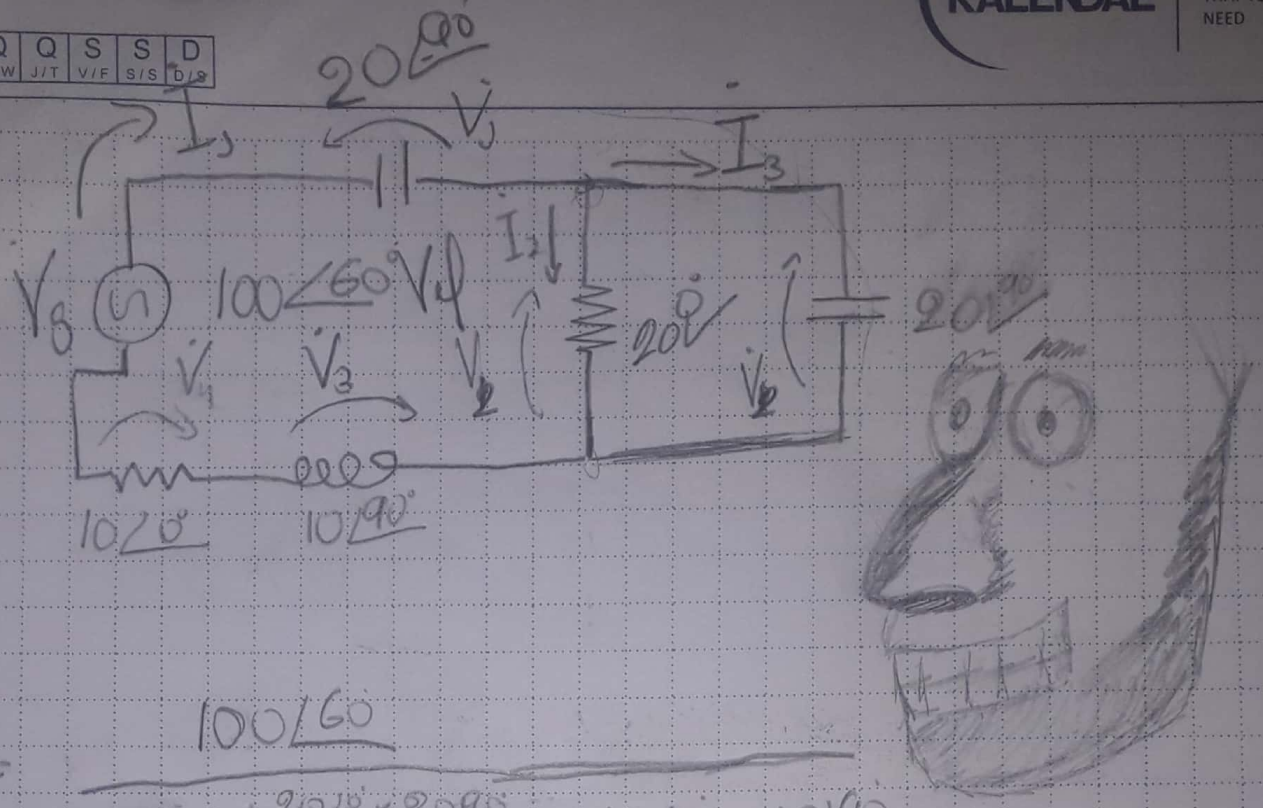
S T Q Q S S D
L/M M/T M/W J/T V/F S/S D/D

(1)



$$\dot{I}_1 = \frac{100\angle 60}{20\angle -90 + \frac{20\angle 0 \times 20\angle 90}{20\angle 90 + 20\angle 0} + 10\angle 0 + 10\angle 90}$$

$$= 3{,}535\angle 105$$

$$\dot{V}_1 = 20\angle -90 \times 3{,}535\angle 105 = +68{,}28 + 18{,}3j$$

$$(0 - 20j) \times (-0{,}915 + 3{,}414j)$$

$$(0 + 68{,}28) + (0 + 18{,}3)j$$

$z = 69{,}0$

$\theta = \text{arcsen}\left(\frac{18{,}3}{69{,}05}\right) = 15{,}37$

$$\dot{V}_1 = 69{,}05\angle 15{,}37 \text{ V}$$

$$\dot{V}_4 = 10\angle 0 \times 3{,}535\angle 105 = -9{,}15 + 34{,}14j = 35{,}34\angle 105$$

$$(10 + 0j) \times (-0{,}915 + 3{,}414j)$$

$z = 35{,}34$

$$(-9{,}15 - 0) + (34{,}14 + 0)j$$

$$\dot{V}_3 = 10\angle 90 \times 3{,}535\angle 105 = -34{,}14 - 9{,}15j = 35{,}34\angle 255$$

$$(0 + 10j) \times (-0{,}915 + 3{,}414j)$$

$$(-34{,}14) + (-9{,}15)j$$

$$\dot{V}_2 = \dot{V}_5 - \dot{V}_1 - \dot{V}_3 - \dot{V}_4$$

$$\dot{V}_2 = 100\angle 60 - 69{,}05\angle 15{,}37 - 35{,}34\angle 105 - 35{,}34\angle 255$$

$$(50 + 86{,}6j) - (68{,}05 + 18{,}3j) - (-9{,}15 + 34{,}14j) - (-34{,}14 - 9{,}15j)$$

$$(-18{,}05 + 68{,}3j)$$

$$(-8{,}99 + 34{,}16j)$$

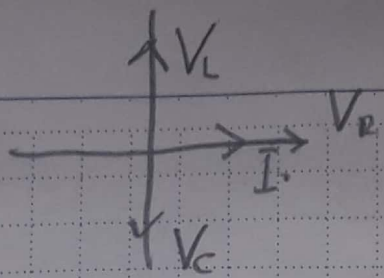
$$(25{,}24 + 43{,}31j)$$

$$\dot{V}_2 = (25{,}24 + 43{,}31j) = 50{,}13\angle 59{,}76$$

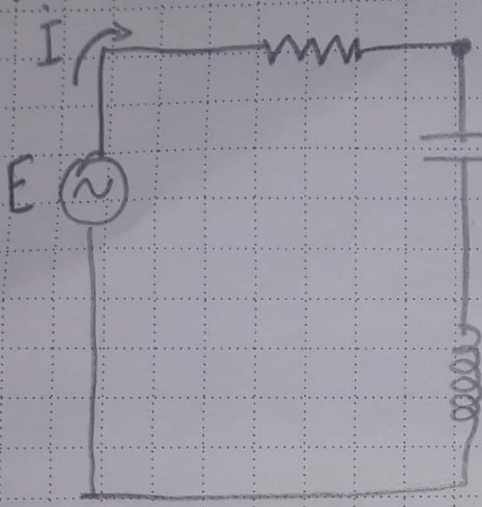
$$\dot{I}_2 = \frac{50{,}13\angle 59{,}76}{20\angle 0} = \frac{(25{,}24 + 43{,}31j)}{(20 + 0j)} = 1{,}26 + 2{,}17j$$

$$= 2{,}5\angle 60°$$

$$\dot{I}_3 = 2{,}5\angle 150$$



2) a)



$\dot{I} = 2\angle 0$

$\dot{V}_C = 60\angle -90$

$Z_C = \frac{V}{I} = 30\angle -90°$

$\dot{Z}_C = \frac{1}{j\omega C} \rightarrow C = \frac{1}{j\,100\pi \cdot 30\angle -90°} = 106,\mu F$

b) $Z_t = 10 + j20 + j30 = 10 - j10$

$= 10\sqrt{2}\ \angle -45°$

$\dot{E} = Z_t \cdot \dot{I} = 10\sqrt{2}\angle -45 \cdot 2\angle 0° = 20\sqrt{2}\angle -45°$

$E(t) = 40\cos(100\pi t - 45°)$