Quiz 3 Solutions

1) Peak to peak value $V_{p-p} = 14.9\,V$

Peak Value $= \frac{V_{p-p}}{2} = \frac{14.9}{2} = 7.45\,V$

rms value $= \frac{7.45}{\sqrt{2}} = 5.27\,V.$

2) $V_c = (1.5t^2 + 3.2t^{3/2} + 5.6)$

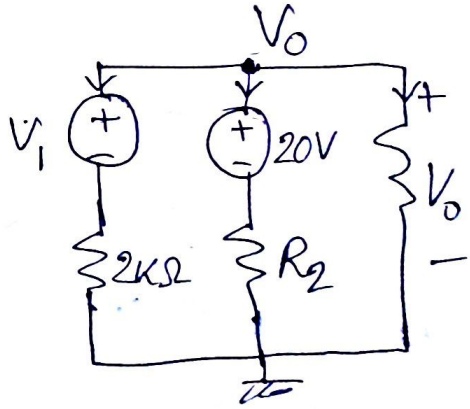
Current through the capacitor at $t = 3.9\,s.$

$i_c = (2 \times 1.5t + 3.2 \times 1.5 \times t^{1/2}) \times 4.8\,\mu A \left[i_c = C\frac{dv_c}{dt} \right]$

$i_c\Big|_{t=3.9} = (2 \times 1.5 \times 3.9 + 3.2 \times 1.5 \times \sqrt{3.9}) \times 4.8$

$= 101.7\,\mu A.$

3) Applying Nodal Analysis



$$\frac{V_o - V_1}{2} + \frac{V_o - 20}{R_2} + \frac{V_o}{4} = 0$$

$$\frac{V_o - 3.1}{2} + \frac{V_o - 20}{1.9} + \frac{V_o}{4} = 0$$

or, $3.8V_o - 3.1 \times 3.8 + 4V_o - 80 + 1.9V_o = 0$

or, $9.7V_o = 91.78$

$V_o = 9.46\,V.$

4) $V_i = 10\angle 0^\circ$

$$Z_c = \frac{1}{j\omega C} = \frac{1}{j \times 1000 \times 11.2 \times 10^{-6}} = -j89.28\ \Omega$$

$$Z_L = j\omega L = j \times 1000 \times 9.8 \times 10^{-3} = +j9.8\ \Omega$$

Total impedance $Z = 100 + j9.8 - j89.28$

$$= (100 - j79.48)\ \Omega$$

Z in polar form, $Z = 127.74\angle -38.47^\circ$

$$\text{Current } I = \frac{V_i}{Z} = \frac{10\angle 0^\circ}{127.74\angle -38.47^\circ}$$

$$= 78.3\angle 38.47^\circ \text{ mA}.$$