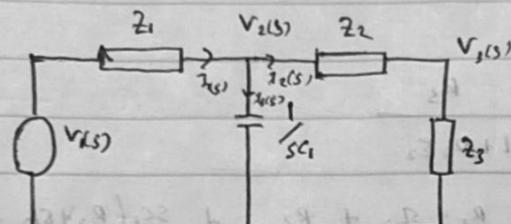
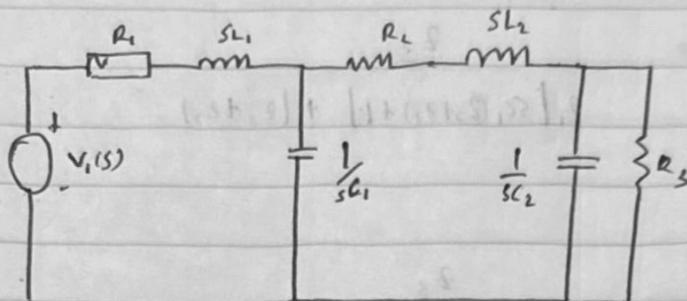


Week 03 Activity 01



$$Z_1 = R_1 + sL_1, \quad Z_2 = R_2 + sL_2, \quad Z_3 = \left[\frac{1}{\frac{1}{sC_1}} + \frac{1}{R_3} \right]^{-1}$$

$$= \frac{R_3}{1 + sR_3 C_2}$$

(2) $\therefore V$

Using Kirchhoff's law.

$$V_1(s) = I_1(s) + I_2(s)$$

$$\frac{V_1(s) - V(s)}{Z_1} = \frac{V_2(s)}{\frac{1}{sC_1}} + \frac{V_3(s)}{Z_3}, \quad \frac{V_2(s)}{Z_3} = \frac{V_2(s) - V_3(s)}{Z_2}$$

$$V_2(s) = \frac{Z_2}{Z_3} V_3(s) + V_3(s)$$

$$\frac{V_1(s) - (Z_2 + Z_3) V_3(s)}{Z_1} = sC_1 \frac{(Z_2 + Z_3) V_3(s)}{Z_3} + \frac{V_3(s)}{Z_3} = \frac{(Z_2 + Z_3) V_3(s)}{Z_3}$$

$$\frac{Z_3 V_1(s) - (Z_2 + Z_3) V_3(s)}{Z_1} = sC_1 (Z_2 + Z_3) + 1 V_3(s)$$

$$Z_3 V_1(s) = \left[Z_1 (sC_1 (Z_2 + Z_3) + 1) + (Z_3 + Z_2) \right] V_3(s)$$

$$\frac{V_3(s)}{V_1(s)} = \frac{Z_3}{Z_1 (sC_1 (Z_2 + Z_3) + 1) + (Z_3 + Z_2)}$$

$$= \frac{Z_3}{Z_1 + Z_2 + Z_3 + sC_1 (Z_2 + Z_3)}$$

$$= \frac{R_3}{1 + sR_3 C_2}$$

$$\frac{R_1 + sL_1 + R_2 + sL_2 + \frac{R_2}{1 + sR_2 C_2} + sC_1 (R_2 + sL_2 + \frac{R_3}{1 + sR_3 C_2})}{R_3}$$

$$(R_1 + R_2 + sL_1 + L_2)(1 + sR_2 C_2) + s(R_2 + sL_2)(1 + sR_3 C_2) + R_3 +$$

$$\frac{V_3(s)}{V_1(s)} = \frac{R_3}{(1 + sR_3 C_2) [R_1 + R_2 + sL_1 + L_2 + R_2 C_1 + sL_2 C_1] + R_3 (1 + sC_1)}$$

ii when R_3 is removed $Z_3 = \frac{1}{sC_2}$ $0.5V + 0.5V = 0.5V$

$$\frac{V_3(s)}{V_1(s)} = \frac{\frac{1}{sC_2}}{R_1 + sL_1 + R_2 + sL_2 + \frac{1}{sC_2} + sC_1 (R_2 + sL_2 + \frac{1}{sC_2})}$$

$$(2.5V - 0.5V) = 2.0V$$

$$(2.5V + 0.5V) = 3.0V$$

$$(2.5V - 0.5V) = 2.0V$$

$$\frac{V_3(s)}{V_1(s)} = \frac{1}{sC_1 [R_1 + R_2 + sL_1 + L_2 + R_2 C_1 + sC_1 L_2] + sC_1 + 1}$$

$$(2.5V + (2.5V - 0.5V) \cdot 0.5) = (2.5V + 1.25V) = 3.75V$$

$$(2.5V - 0.5V) = 2.0V$$

$$0.5V [1 + sC_1 (R_2 + L_2)] = 0.5V (1 + 0.5V) = 0.75V$$

Atlas