Circuitos Puentes.

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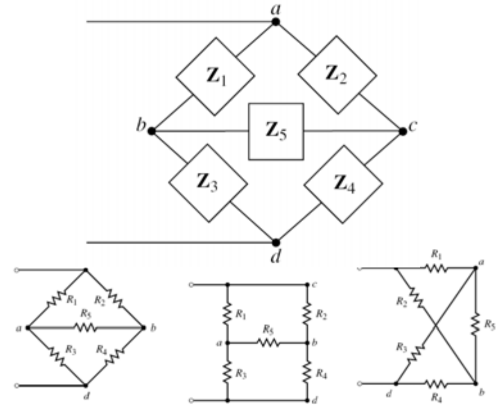
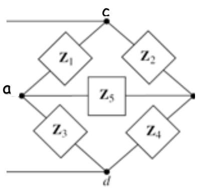


Cuando la I por Z_5 es nula el puente está balanceado. Entonces:



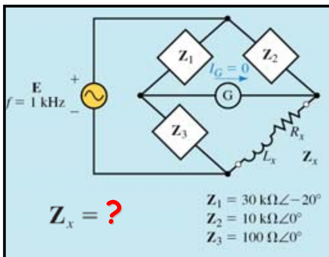
$$\boxed{V_{ab}=(Z_5)(0A)=0V}$$

$$I_{Z_1}=I_{Z_3}=\frac{V_{cd}}{Z_1+Z_3} \qquad I_{Z_2}=I_{Z_4}=\frac{V_{cd}}{Z_2+Z_4}$$

$$V_{ad}=V_{bd} \rightarrow Z_3 I_{Z_3}=Z_4 I_{Z_4} \qquad Z_3\left(\frac{V_{cd}}{Z_1+Z_3}\right)=Z_4\left(\frac{V_{cd}}{Z_2+Z_4}\right)$$

$$\frac{Z_3}{Z_1+Z_3}=\frac{Z_4}{Z_2+Z_4} \qquad \frac{Z_1}{Z_3}+1=\frac{Z_2}{Z_4}+1$$

$$\boxed{\frac{Z_1}{Z_3}=\frac{Z_2}{Z_4}}$$



$$Z_x = ?$$

$$Z_x=\frac{Z_2 Z_3}{Z_1}$$

$$=\frac{(10\ \mathrm{k\Omega})(100\ \Omega)}{30\ \mathrm{k\Omega}\angle -20^\circ}$$

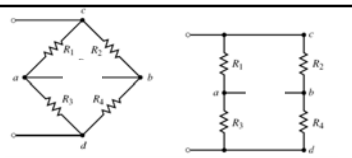
$$=33.3\ \Omega\angle 20^\circ$$

$$=31.3+j11.4\ \Omega$$

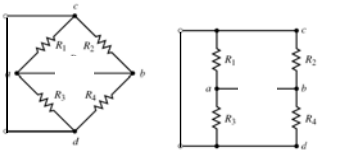
Determine R_X y L_X :

$$R_x = 31.3\ \Omega$$

$$L_x=\frac{X_L}{2\pi f}=\frac{11.4\ \Omega}{2\pi(1000\ \mathrm{Hz})}=1.81\ \mathrm{mH}$$

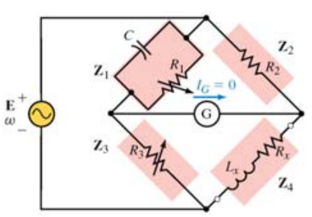


$R_{Equivalente}=(R_1+R_2)//(R_3+R_4)$



$R_{Equivalente}=R_1//R_3+R_2//R_4$

Puente de Maxwell:



Sirve para determinar la inductancia y la resistencia serie de un inductor.

$X_L<R$

R_1 y R_3 son ajustadas hasta que $I_G=0$

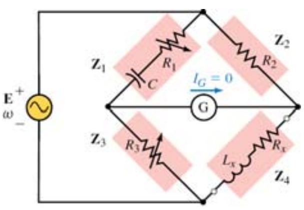
$$\frac{Z_1}{Z_2}=\frac{Z_3}{Z_4}$$

$$\frac{\left[\dfrac{(R_1)\left(-j\dfrac{1}{\omega C}\right)}{R_1-j\dfrac{1}{\omega C}}\right]}{R_2}=\frac{R_3}{R_x+j\omega L_x}$$

$$L_x = R_2 R_3 C$$

$$R_x=\frac{R_2 R_3}{R_1}$$

Puente de Hay:

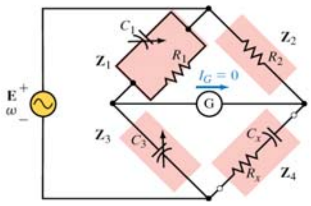


$X_L > R$

$$L_x = \frac{R_2 R_3 C}{\omega^2 R_1^{\,2} C^2 + 1}$$

$$R_x = \frac{\omega^2 R_1 R_2 R_3 C^2}{\omega^2 R_1^{\,2} C^2 + 1}$$

Puente de Schering:



Sirve para determinar el valor de un capacitor desconocido.

$$C_x = \frac{R_1 C_3}{R_2}$$

$$R_x = \frac{C_1 R_2}{C_3}$$