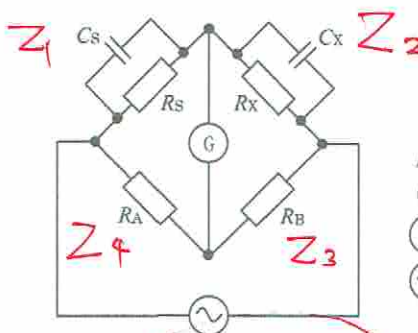


A-4 図に示す交流ブリッジ回路が平衡状態にあるとき、抵抗 R_x 及び静電容量 C_x を求める式の組合せとして、正しいものを下の番号から選べ。

- 1 $R_x = \frac{R_B}{R_A} R_S$ $[\Omega]$, $C_x = \frac{R_B}{R_A} C_S$ [F]
 2 $R_x = \frac{R_B}{R_A} R_S$ $[\Omega]$, $C_x = \frac{R_A}{R_B} C_S$ [F]
 3 $R_x = \frac{R_A}{R_B} R_S$ $[\Omega]$, $C_x = \frac{R_B}{R_A} C_S$ [F]
 4 $R_x = \frac{R_A}{R_B} R_S$ $[\Omega]$, $C_x = \frac{R_A}{R_B} C_S$ [F]

$$\frac{1}{2\pi f C} \rightarrow C_s = \frac{1}{j\omega C_s}$$

$$C_x = \frac{1}{j\omega C_x}$$



$$Z_1 : Z_2 = Z_4 : Z_3$$

$$Z_1 Z_3 = Z_2 Z_4$$

(HZ608-1)

$$Z_1 = \frac{1}{\frac{1}{R_s} + \frac{1}{\frac{1}{j\omega C_s}}} = \frac{1}{\frac{1}{R_s} + j\omega C_s}$$

$$Z_2 = \frac{1}{\frac{1}{R_x} + j\omega C_x}$$

$$Z_3 = R_B$$

$$Z_4 = R_A$$

$$\frac{1}{\frac{1}{R_s} + j\omega C_s} R_B = \frac{1}{\frac{1}{R_x} + j\omega C_x} R_A$$

$$\frac{R_B R_s}{1 + j\omega C_s R_s} = \frac{R_A R_x}{1 + j\omega C_x R_x}$$

$$R_B R_s (1 + j\omega C_x R_x) = R_A R_x (1 + j\omega C_s R_s)$$

$$R_B R_s + j\omega C_x R_B R_s R_x = R_A R_x + j\omega C_s R_A R_s R_x$$

実数虚. 恒等式

$$R_B R_s = R_A R_x$$

$$C_x R_B R_s R_x = C_s R_A R_s R_x$$

$$C_x R_B = C_s R_A$$

$$\boxed{R_x = \frac{R_B}{R_A} R_s} \quad \boxed{C_x = \frac{R_A}{R_B} C_s}$$

問題集「理工系」土野隆平著