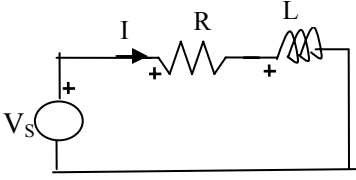


1) $v_s = 100 \cos(20t + 30)$, $R = 40\Omega$, $L = 3H$, Güçleri hesaplayın.



$$V_s = 100 e^{j30} = 86.6 + 50j$$

$$Z = R + j\omega L = 40 + j \cdot 20 \cdot 3 = 40 + 60j$$

$$I_x = V_s / Z = (86.6 + 50j) / (40 + 60j)$$

$$I_x = 1.2431 - 0.6146j = 1.38 e^{-j26},$$

a) R de harcana güç:

$$S = 0.5 V I^* = (R I) I^* = 0.5 \cdot 40 (1.24 - 0.614j) (1.24 + 0.614j)$$

$$= 0.5 \cdot 40 \cdot 1.92 = 38.4 + j0$$

$$P = 38.4 \text{ W}, \quad Q = 0$$

b) L de harcanan güç

L de harcana güç:

$$S = 0.5 V I^* = (j\omega L I) I^* =$$

$$0.5 j20 \cdot 3 (1.2431 - 0.6146j) (1.2431 + 0.6146j)$$

$$= 0.5 \cdot 60j \cdot 1.92 = 0 + 57.7j$$

$$P = 0, \quad Q = 57.7 \text{ VAR},$$

c) R ve L yi beraber düşünüp güç hesaplayalım.

$$z = R + j\omega L = 40 + 60j$$

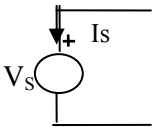
$$S = 0.5 V I^* = Z I I^*$$

$$= 0.5 (40 + 60j) (1.24 - 0.61j) (1.243 + 0.61j)$$

$$= 38.4 + j 57.7$$

$$P = 38.4, \quad Q = 57.7 \text{ VAR},$$

d) Kaynagin verdigi güç.



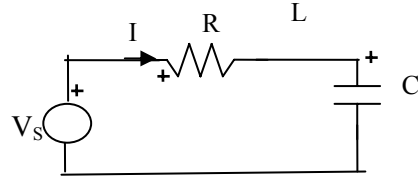
butun devre elemanlarinda + isaretinin oldugu yerden akim girdigi durum pozitif durum olarak kabul edilir.

$$S = 0.5 V_s I_s^* = 0.5 V_s (-I)^* = -0.5 (86.6 + 50j) (1.243 + 0.61j)$$

$$= -38.4 - 57.7j$$

$$P = -38.4 \text{ W}, \quad Q = -57.7 \text{ VAR}$$

2) $v_s = 100 \cos(20t + 30)$, $R = 40\Omega$, $C = 0.001F$, Güçleri hesaplayın



$$V_s = 100 e^{j30} = 86.6 + 50j$$

$$Z = R + (1/j\omega C) = 40 + (1/j \cdot 20 \cdot 3) = 40 - 50j$$

$$I_x = V_s / Z = (86.6 + 50j) / (40 - 50j)$$

$$I_x = 0.23 + 1.54j = 1.56 e^{j81},$$

a) R de harcana güç:

$$S = 0.5 V I^* = (R I) I^* = 0.5 \cdot 40 (0.23 + 1.54j) (0.23 - 1.54j)$$

$$= 0.5 \cdot 40 \cdot 2.43 = 48.7 + j0$$

$$P = 48.7 \text{ W}, \quad Q = 0$$

b) C de harcanan güç

C de harcana güç:

$$S = 0.5 V I^* = (j\omega L I) I^* =$$

$$0.5 (-j50) (0.23 + 1.54j) (0.23 - 1.54j)$$

$$= 0.5 (-j50) \cdot 2.43 = 0 - 60.97j$$

$$P = 0, \quad Q = -60.9 \text{ VAR},$$

c) R ve C yi beraber düşünüp güç hesaplayalım.

$$z = R + 1/j\omega C = 40 - 50j$$

$$S = 0.5 V I^* = Z I I^*$$

$$= 0.5 (40 - 50j) (0.23 + 1.54j) (0.23 - 1.54j)$$

$$= 48.7 - j 60.9$$

$$P = 48.97, \quad Q = -60.9 \text{ VAR},$$

d) Kaynagin verdigi güç.

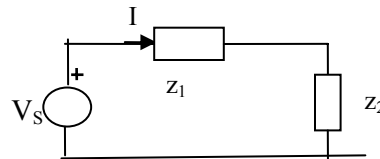
$$S = 0.5 V_s I_s^* = 0.5 V_s (-I)^*$$

$$= -0.5 (86.6 + 50j) (0.23 - 1.54j)$$

$$= -48.4 + 60.9j$$

$$P = -48.4 \text{ W}, \quad Q = +60.9 \text{ VAR}$$

3) 1) $v_s = 100 \cos(20t + 30)$, $z_1 = 40 + 50j$, $z_2 = 50 - 30j$, Güçleri hesaplayın.



$$V_s = 100 e^{j30} = 86.6 + 50j$$

$$Z = z_1 + z_2 = 90 + 20j$$

$$I_x = V_s / Z = (86.6 + 50j) / (90 + 20j) = 1.03 + 0.32j$$

$$I_x = 1.03 + 0.32j = 1.08 e^{j17},$$

a) z1 de harcana güç:

$$S = 0.5V I^* = 0.5 (z_1 I) I^* = 23.5 + 29.4j$$

$$P_1 = 23.5 \text{ W}, \quad Q_1 = 29.4 \text{ VAR}$$

b) z_2 de harcana guc:

$$S = 0.5V I^* = 0.5 (z_2 I) I^* = 29.41 - 17.6j$$

$$P_2 = 29.41 \text{ W}, \quad Q_2 = -17.6 \text{ VAR}$$

c) Kaynagin verdigi guc.

$$S = 0.5 V_s I_s^* = 0.5 V_s (-I)^*$$

$$= -0.5 (86.6 + 50j) (1.03 - 0.32j)$$

$$= -52.59 - 11.89j$$

$$P_s = -52.59 \text{ W}, \quad Q_s = -11.89 \text{ VAR}$$

d) kontrol

$$P_s = P_1 + P_2$$

$$Q_s = Q_1 + Q_2$$