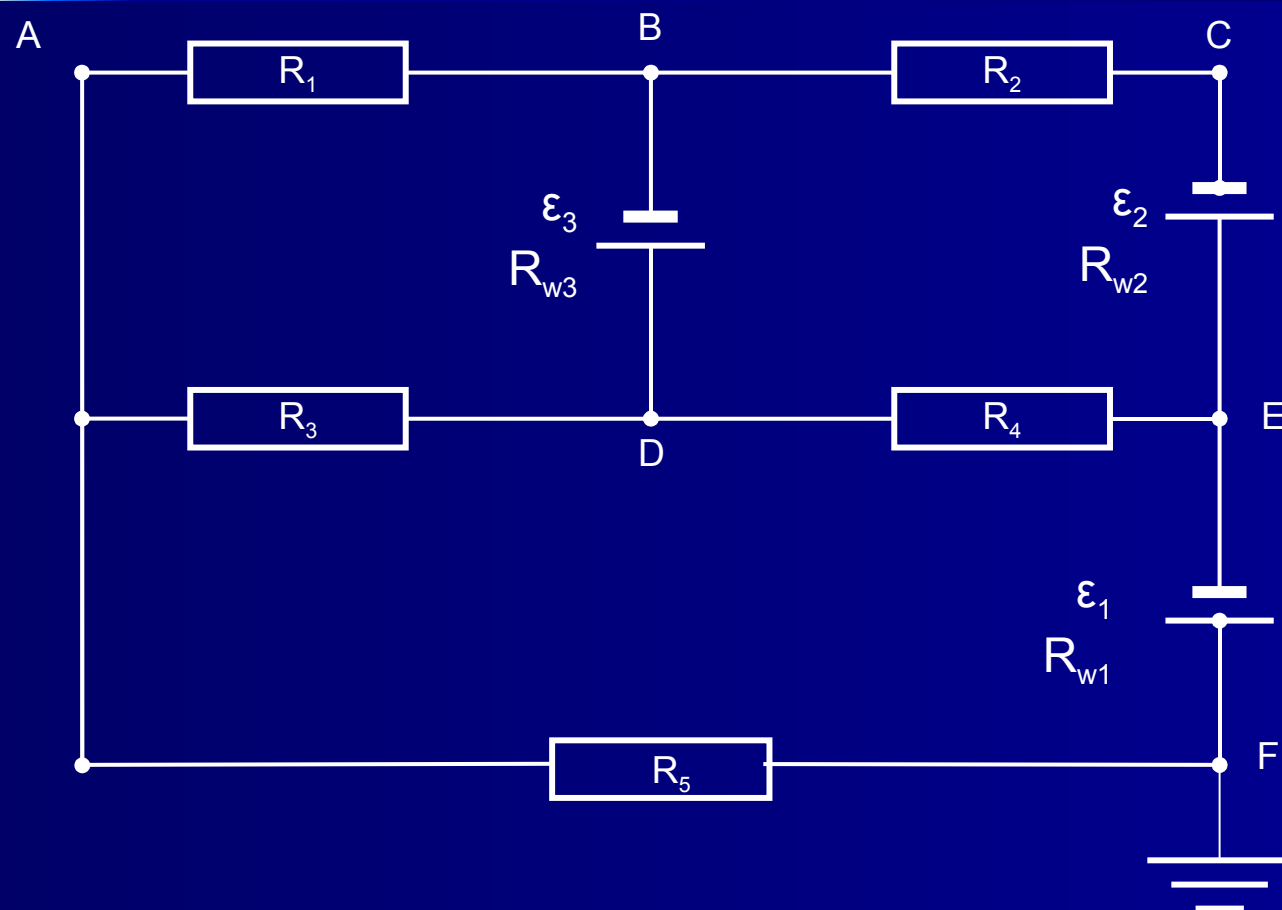


Ćwiczenie 10



Ćwiczenie 10

Dane obwodu:

$$R_1 = 16 \text{ } [\Omega]$$

$$R_2 = 9 \text{ } [\Omega]$$

$$R_3 = 16 \text{ } [\Omega]$$

$$R_4 = 8 \text{ } [\Omega]$$

$$R_5 = 14 \text{ } [\Omega]$$

$$\varepsilon_1 = 10 \text{ } [\text{V}]$$

$$\varepsilon_2 = 15 \text{ } [\text{V}]$$

$$\varepsilon_3 = 5 \text{ } [\text{V}]$$

$$R_{w1} = 2 \text{ } [\Omega]$$

$$R_{w2} = 3 \text{ } [\Omega]$$

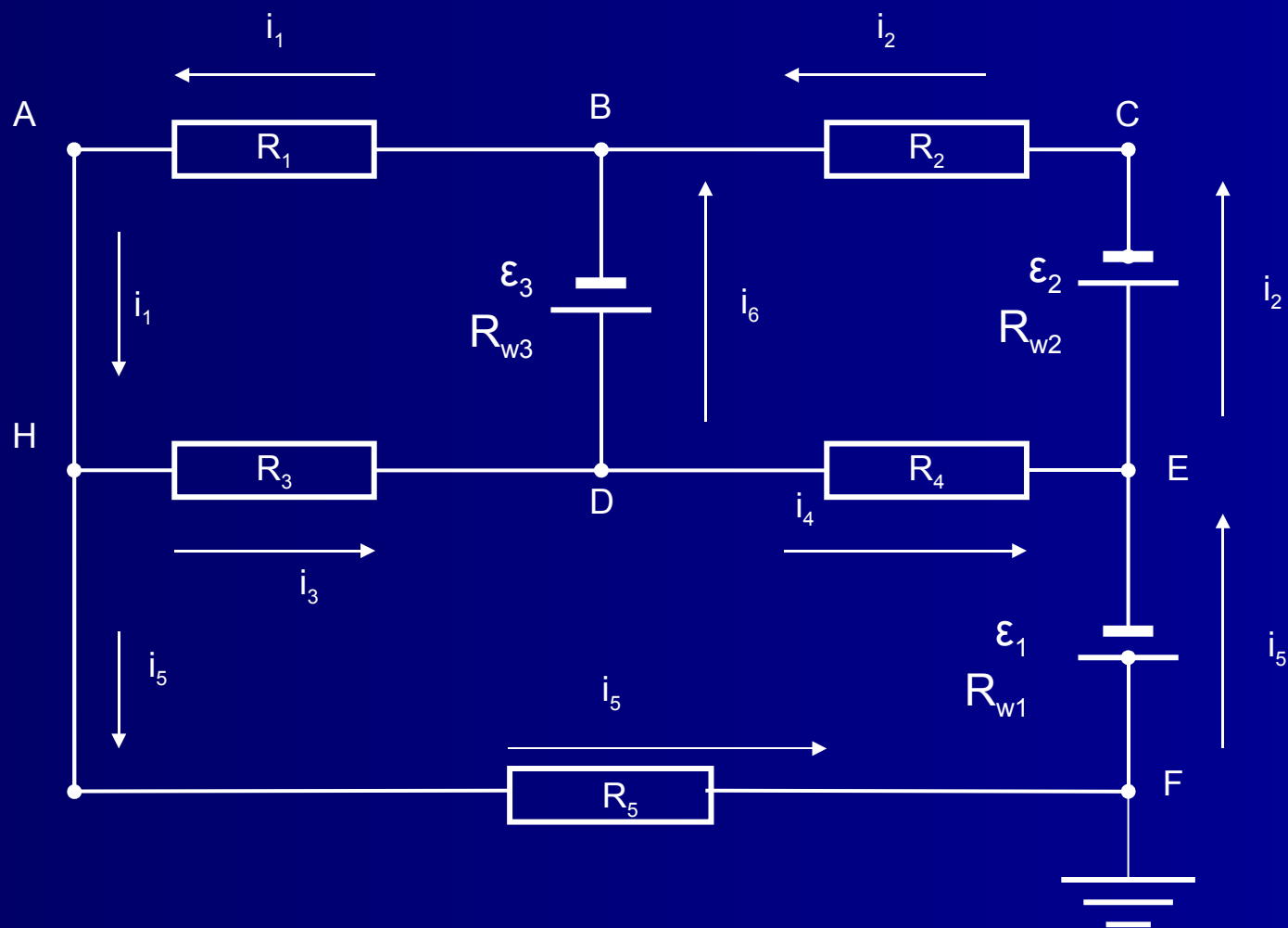
$$R_{w3} = 1 \text{ } [\Omega]$$

Ćwiczenie 10

Oblicz potencjał względem masy punktów: A, B, C, D, E, F

Oblicz różnicę potencjałów między punktami: FA, EB, DC

Ćwiczenie 10



Ćwiczenie 10

DBAH

$$\varepsilon_3 = i_6 \cdot R_{w3} + i_1 \cdot R_1 + i_3 \cdot R_3$$

EFHG

$$\varepsilon_1 = i_5 \cdot (R_{w1} + R_5) - i_4 \cdot R_4 - i_3 \cdot R_3$$

ECBD

$$\varepsilon_2 - \varepsilon_3 = i_2 \cdot (R_{w2} + R_2) - i_6 \cdot R_{w3} + i_4 \cdot R_4$$

Ćwiczenie 10

$$5[V] = i_6 \cdot 1[\Omega] + i_1 \cdot 16[\Omega] + i_3 \cdot 16[\Omega]$$

$$10[V] = i_5 \cdot 16[\Omega] - i_4 \cdot 8[\Omega] - i_3 \cdot 16[\Omega]$$

$$15[V] - 5[V] = i_2 \cdot 12[\Omega] - i_6 \cdot 1[\Omega] + i_4 \cdot 8[\Omega]$$

Ćwiczenie 10

$$5[A] = i_6 + 16 \cdot i_1 + 16 \cdot i_3$$

$$1,25[A] = 2 \cdot i_5 - i_4 - 2 \cdot i_3$$

$$10[A] = 12 \cdot i_2 - i_6 + 8 \cdot i_4$$

Ćwiczenie 10

$$B \quad i_1 = i_2 + i_6$$

$$E \quad i_2 = i_4 + i_5$$

$$D \quad i_3 = i_6 + i_4$$

Ćwiczenie 10

$$5[A] = i_6 + 16 \bullet (i_2 + i_6) + 16 \bullet (i_6 + i_4)$$

$$1,25[A] = 2 \bullet (i_2 - i_4) - i_4 - 2 \bullet (i_6 + i_4)$$

$$10[A] = 12 \bullet i_2 - i_6 + 8 \bullet i_4$$

Ćwiczenie 10

$$i_6 = 12 \bullet i_2 + 8 \bullet i_4 - 10[A]$$

$$5[A] = 33 \bullet (12 \bullet i_2 + 8 \bullet i_4 - 10[A]) + 16 \bullet i_2 + 16 \bullet i_4$$

$$1,25[A] = 2 \bullet i_2 - 5 \bullet i_4 - 2 \bullet (12 \bullet i_2 + 8 \bullet i_4 - 10[A])$$

Ćwiczenie 10

$$335[A] = 412 \cdot i_2 + 280 \cdot i_4$$

$$18,75[A] = 22 \cdot i_2 + 21 \cdot i_4$$

$$i_2 = 0,852[A] - 0,954 \cdot i_4$$

$$335[A] = 412 \cdot (0,852[A] - 0,954 \cdot i_4) + 280 \cdot i_4$$

$$335[A] = 351[A] - 393 \cdot i_4 + 280 \cdot i_4$$

$$113 \cdot i_4 = 16[A]$$

$$i_4 = 0,142[A]$$

Ćwiczenie 10

$$i_4 = 0,142[A]$$

$$i_2 = 0,852[A] - 0,954 \cdot 0,142[A]$$

$$i_2 = 0,716[A]$$

$$i_6 = 12 \cdot 0,716[A] + 8 \cdot 0,142[A] - 10[A]$$

$$i_6 = -0,265[A]$$

Ćwiczenie 10

$$i_3 = 0,142[A] - 0,265[A]$$

$$i_3 = -0,122[A]$$

$$i_5 = 0,716[A] - 0,142[A]$$

$$i_5 = 0,574[A]$$

$$i_1 = 0,716[A] - 0,265[A]$$

$$i_1 = 0,451[A]$$

Ćwiczenie 10

$$U_F = 0$$

$$U_E = \varepsilon_1 - i_5 \cdot R_{w1}$$

$$U_E = 10[V] - 0,574[A] \cdot 2[\Omega]$$

$$U_E = 8,85[V]$$

$$U_C = U_E + \varepsilon_2 - i_2 \cdot R_{w2}$$

$$U_C = 8,85[V] + 15[V] - 0,717[A] \cdot 3[\Omega]$$

$$U_C = 21,7[V]$$

Ćwiczenie 10

$$U_B = U_C - i_2 \cdot R_2$$

$$U_B = 21,7[V] - 0,716[A] \cdot 9[\Omega]$$

$$U_B = 15,26[V]$$

$$U_A = U_B - i_1 \cdot R_1$$

$$U_A = 15,26[V] - 0,451[A] \cdot 16[\Omega]$$

$$U_A = 8,03[V] = U_H$$

Ćwiczenie 10

$$U_F = U_H - i_5 \cdot R_5$$

$$U_F = 8,03[V] - 0,574[A] \cdot 14[\Omega]$$

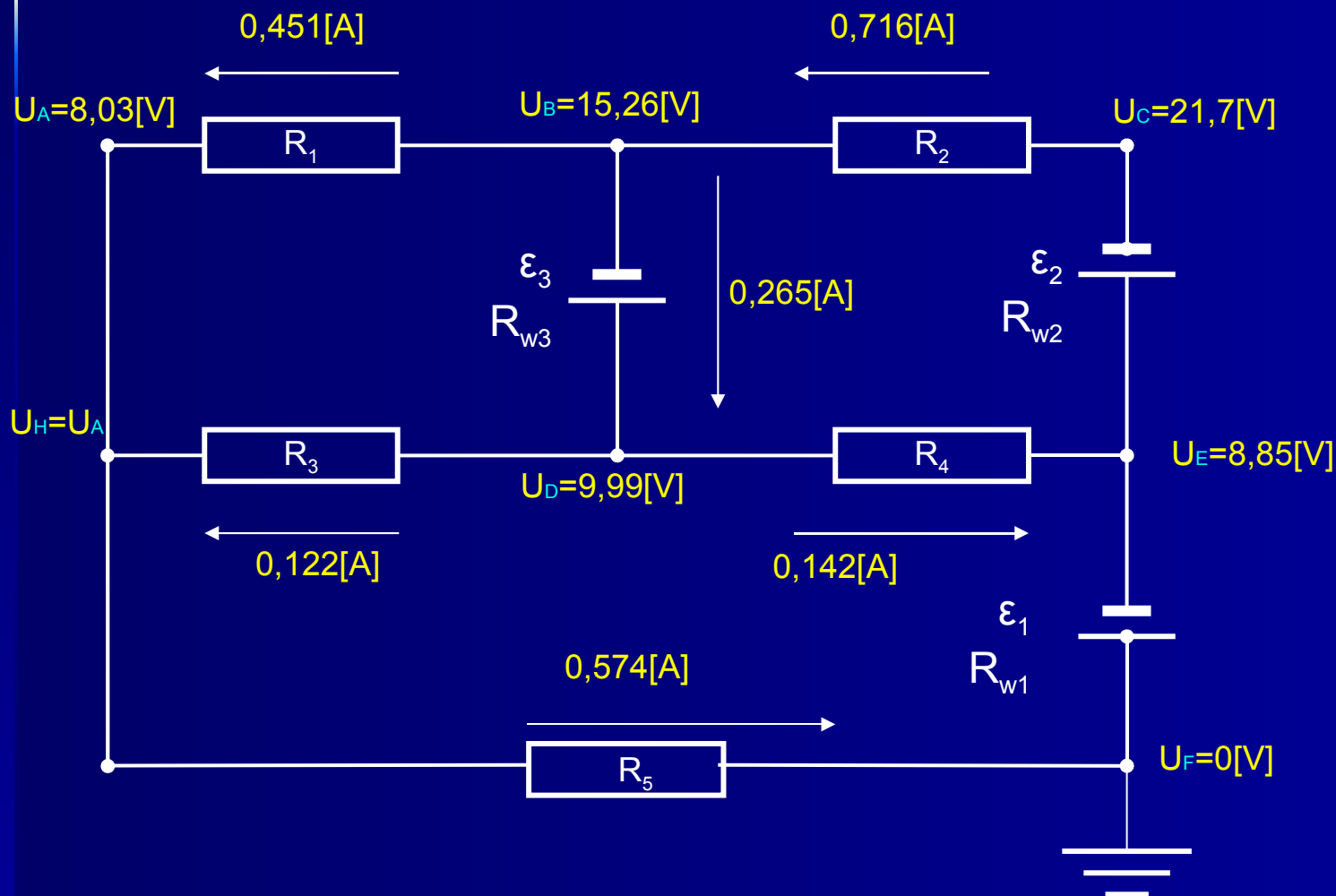
$$U_F = 0[V]$$

$$U_D = U_H - i_3 \cdot R_{31}$$

$$U_D = 8,03[V] - (-)0,122[A] \cdot 16[\Omega]$$

$$U_D = 9,99[V]$$

Ćwiczenie 10



Ćwiczenie 10

$$U_{FA} = U_A - U_F = 8,03[V] - 0[V]$$

$$U_{FA} = 8,03[V]$$

$$U_{EB} = U_B - U_E = 15,26[V] - 8,03[V]$$

$$U_{EB} = 7,23[V]$$

$$U_{DC} = U_C - U_D = 21,7[V] - 9,99[V]$$

$$U_{DC} = 11,71[V]$$