

"Elektrijada 2012, oblast III, zadatak 1, maj 2012";

"Oznake: struja kroz otpornik uz ulaz  $U1/R$  - odozgo prema dole, struja kroz otpornik uz izlaz  $U2/R$  - odozgo prema dole, struja kroz  $N1$   $I3$  - odozgo prema dole, struja kroz otpornik  $3R$   $mI3$  - s leva na desno, struja kroz srednji otpornik  $I2+U2/R-mI3$  - s leva na desno, napon na  $N1$   $U3$  + uz saglasni kraj, napon na  $N2$   $U3/m$  + uz saglasni kraj, struja kroz otpornik  $5R$   $U1/R-I1$  s leva na desno";

" $R=10$ ";

Rez = Flatten[Solve[{

$$U1 == -5 * R * \left( \frac{U1}{R} - I1 \right) + U2 - \frac{U3}{m} + 3 * m * R * I3,$$

$$U3 == U2 + R * \left( I2 + \frac{U2}{R} - m * I3 \right),$$

$$I1 == \frac{U1}{R} + I3 + I2 + \frac{U2}{R},$$

$$U3 == 5 * R * \left( \frac{U1}{R} - I1 \right) + U1 \},$$

{U1, U3, I1, I3}]]];

Print["A = ", AA = Coefficient[U1 /. Rez, U2], ", B = ", BB = Coefficient[U1 /. Rez, I2],  
"  $\Omega$ , C = ", CC = Coefficient[I1 /. Rez, U2], " S, D = ",

DD = Simplify[Coefficient[I1 /. Rez, I2]], "."]

Print["Provera: AD-BC = ", Simplify[AA\*DD - BB\*CC], "."]

$$A = -\frac{-10 - 10m - 27m^2}{m(1 + 4m)}, \quad B = -\frac{-5R - 10mR - 23m^2R}{m(1 + 4m)} \Omega, \quad C = -\frac{-12 - 12m - 31m^2}{m(1 + 4m)R} S, \quad D = \frac{6 + 12m + 27m^2}{m + 4m^2}.$$

Provera: AD-BC = 1.

Print["Uslov zadatka: ", FullSimplify[AA-DD], "=0."]

$$\text{Uslov zadatka: } \frac{4 - 2m}{m + 4m^2} = 0.$$

"Sledi:";

Print["m = ", m = 2]

m = 2

Print["Zc = ", Zc = Simplify[ $\sqrt{\frac{BB}{CC}}$ , R > 0], "  $\Omega$  = ", Zc // N, "  $\Omega$ , Gamac = ",

Gamac = Log[ $\sqrt{AA} + \sqrt{BB*CC}$ ] // N, " Np = ", 8.686\*Gamac, " dB."]

$$Zc = \frac{3}{4} \sqrt{\frac{13}{10}} R \Omega = 0.855132 R \Omega, \quad \text{Gamac} = 2.33892 \text{ Np} = 20.3159 \text{ dB}.$$