

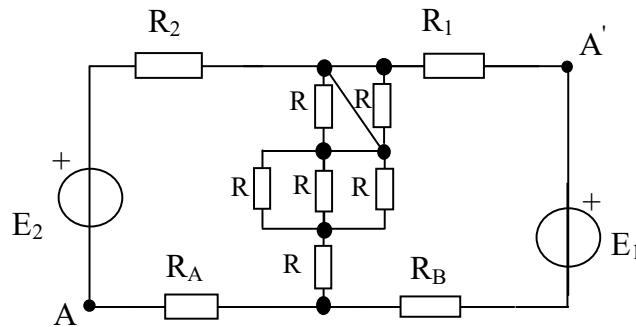
Zadaci za pripremu kolokvijuma

A

1. U kolu na slici odrediti

- Otpornost otpornika R_A , tako da se na njemu razvije maksimalna snaga,
- Jačine struja u svim granama,
- Napon $U_{AA'}$,
- Snagu generatora elektromotorne sile E_1 ,
- Snagu koja se razvija na otporniku otpornosti R_A ,

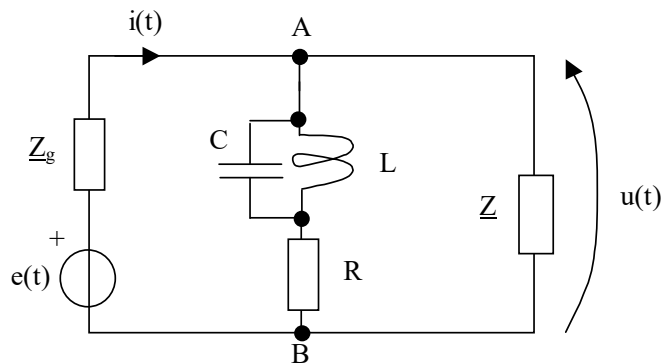
Brojni podaci: $E_1=15\text{ V}$, $E_2=10\text{ V}$, $R_1=5\ \Omega$, $R_2=10\ \Omega$, $R_B=25\ \Omega$, $R=15\ \Omega$.



2. U kolu na slici odrediti

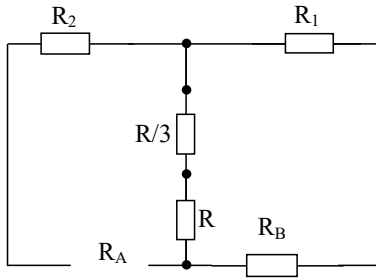
- Ekvivalentnu impedansu $\underline{Z}_{AB}$, kojom se mogu zameniti elementi R , L , C i $\underline{Z}$.
- Trenutnu vrednost jačine struje $i(t)$,
- Trenutnu vrednost napona $u(t)$,
- Kompleksnu snagu generatora ems $e(t)$,

Poznato je: $e(t) = 25\sqrt{2} \cos(1000t + \frac{12\pi}{4})\text{ V}$, gde je t u sekundama, $\underline{Z}_g = (10+j10)\Omega$, $L=20\text{ mH}$, $C=100\mu\text{F}$, $R=30\Omega$, $\underline{Z}=(30-j20)\Omega$.



Zadaci za pripremu kolokvijuma.

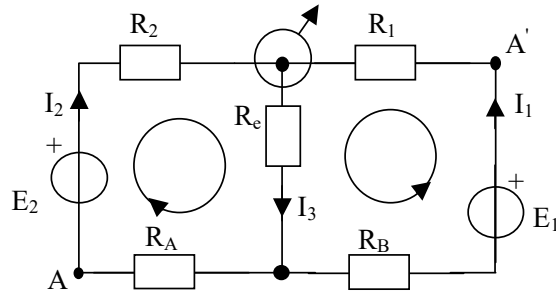
1.



a) $R_A = R_2 + (R_1 + R_B) \parallel (R + R/3)$
 $R_A = 10 + 30 \parallel 20 = 10 + 12$
 $R_A = 22 \Omega$

b) $I_1 = 0.26 A$
 $I_2 = 0.09 A$
 $I_3 = 0.35 A$

A



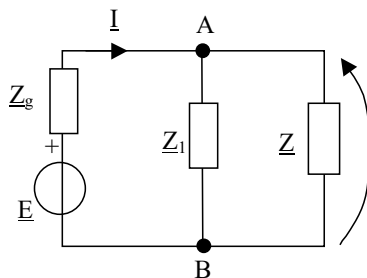
1: $I_3 - I_1 - I_2 = 0$
 2: $-E_2 + (R_2 + R_A)I_2 + R_e I_3 = 0$
 3: $-E_1 + (R_1 + R_B)I_1 + R_e I_3 = 0$

c) $U_{AA'} = -E_2 + R_2 I_2 - R_1 I_1 = -10.4 V$

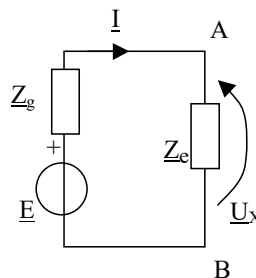
d) $P_{E1} = E_1 I_1 = 3.9 W$

e) $P_{RA} = R_A (I_2)^2 = 2.1875 W$

2. $e(t) = 25\sqrt{2} \cos(1000t + \frac{12\pi}{4}) V$, $\underline{Z}_g = (10 + j10) \Omega$, $L = 20 mH$, $C = 100 \mu F$, $R = 30 \Omega$, $\underline{Z} = (30 - j20) \Omega$.



$\underline{Z}_L = j\omega L = j20 \Omega$
 $\underline{Z}_C = -j/\omega C = -j10 \Omega$
 $\underline{Z}_R = 30 \Omega$
 $\underline{Z}_1 = \underline{Z}_R + \underline{Z}_L \parallel \underline{Z}_C$
 $\underline{Z}_1 = (30 - j20) \Omega$



a) $\underline{Z}_{AB} = \underline{Z}_1 \parallel \underline{Z}$
 $\underline{Z}_{AB} = (15 - j10) \Omega$
 $\underline{E} = 25e^{j180} V$
 $\underline{E} = -25 V$

b) $\underline{I} = \frac{\underline{E}}{\underline{Z}_g + \underline{Z}_{AB}} = -1 = 1 \cdot e^{j180} A$

$i(t) = \sqrt{2} \cdot \cos(1000t \pm 180^\circ) A$

c) $\underline{U} = \underline{I} \cdot \underline{Z}_{AB} = (-15 + j10) V = 18.02 \cdot e^{j146.3^\circ} V$ $u(t) = 25.5 \cdot \cos(1000t + 146.3^\circ) V$

d) $\underline{S} = \underline{E} \cdot \underline{I}^* = (25 + j0) VA = 25 VA$

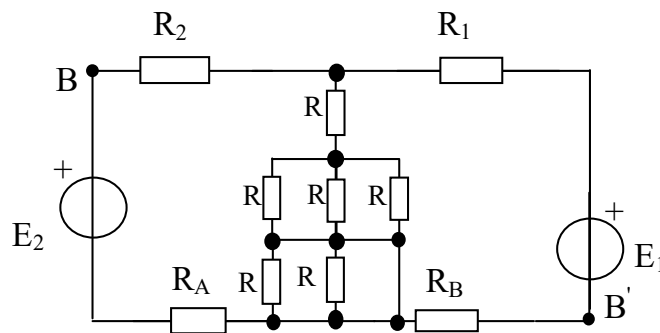
Zadaci za pripremu kolokvijuma

B

1. U kolu na slici odrediti

- Otpornost otpornika R_B , tako da se na njemu razvije maksimalna snaga,
- Napon $U_{BB'}$,
- Snagu generatora elektromotorne sile E_2 ,
- Snagu koja se razvija na otporniku otpornosti R_B ,

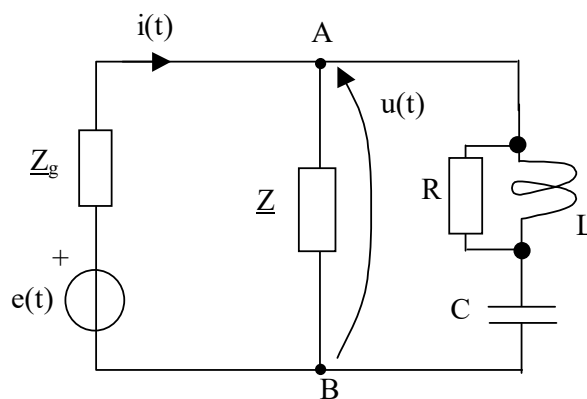
Brojni podaci: $E_1=15\text{ V}$, $E_2=10\text{ V}$, $R_1=10\ \Omega$, $R_2=5\ \Omega$, $R_A=25\ \Omega$, $R=15\ \Omega$.



2. U kolu na slici odrediti

- Ekvivalentnu impedansu $\underline{Z}_{AB}$, kojom se mogu zameniti elementi R , L , C i $\underline{Z}$.
- Trenutnu vrednost jačine struje $i(t)$,
- Trenutnu vrednost napona $u(t)$,
- Kompleksnu snagu generatora ems $e(t)$,

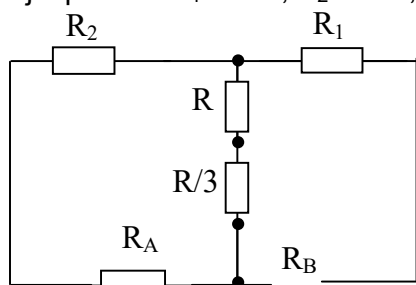
Poznato je: $e(t) = 20\sqrt{2} \cos(1000t + \frac{12\pi}{3})\text{ V}$, gde je t u sekundama, $\underline{Z}_g = (8+j4)\ \Omega$, $L=20\text{ mH}$, $C=50\ \mu\text{F}$, $R=20\ \Omega$, $\underline{Z} = (20+j20)\ \Omega$.



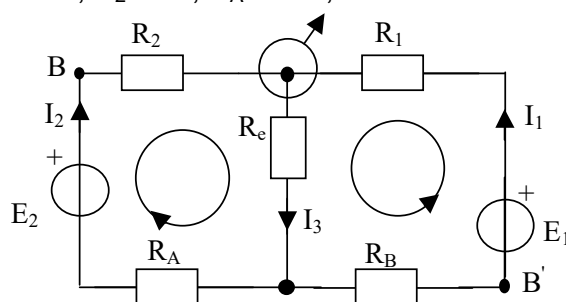
Zadaci za pripremu kolokvijuma

B

1. Brojni podaci: $E_1=15\text{ V}$, $E_2=10\text{ V}$, $R_1=10\ \Omega$, $R_2=5\ \Omega$, $R_A=25\ \Omega$, $R=15\ \Omega$.



a) $R_B = R_1 + (R_2 + R_A) \parallel (R + R/3)$
 $R_B = 10 + 30 \parallel 20 = 10 + 12$
 $R_B = 22\ \Omega$



1: $I_3 - I_1 - I_2 = 0$
 2: $-E_2 + (R_2 + R_A)I_2 + R_e I_3 = 0$
 3: $-E_1 + (R_1 + R_B)I_1 + R_e I_3 = 0$

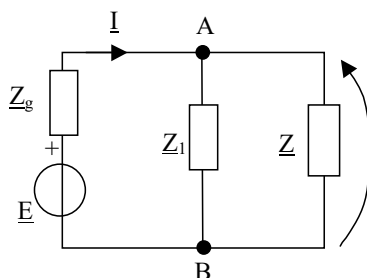
b) $I_1 = 0.25\text{ A}$
 $I_2 = 0.1\text{ A}$
 $I_3 = 0.35\text{ A}$

c) $U_{BB'} = R_2 I_2 - R_1 I_1 + E_1 = 13\text{ V}$

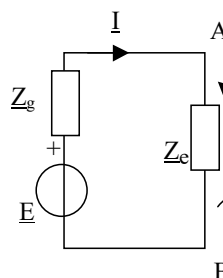
d) $P_{E2} = E_2 I_2 = 1\text{ W}$

e) $P_{RB} = R_B (I_1)^2 = 1.375\text{ W}$

2. $e(t) = 20\sqrt{2} \cos(1000t + \frac{12\pi}{3})\text{ V}$, $Z_g = (8 + j4)\ \Omega$, $L = 20\text{ mH}$, $C = 50\ \mu\text{F}$, $R = 20\ \Omega$, $Z = (20 + j20)\ \Omega$.



$Z_L = j\omega L = j20\ \Omega$
 $Z_C = -j/\omega C = -j20\ \Omega$
 $Z_R = 20\ \Omega$
 $\underline{U} \quad \underline{Z}_1 = \underline{Z}_C + \underline{Z}_L \parallel \underline{Z}_R$
 $\underline{Z}_1 = (10 - j10)\ \Omega$



a) $\underline{Z}_{AB} = \underline{Z}_1 \parallel \underline{Z}$
 $\underline{Z}_{AB} = (12 - j4)\ \Omega$
 $\underline{E} = 20e^{j0}\text{ V}$
 $\underline{E} = 20\text{ V}$

b) $\underline{I} = \frac{\underline{E}}{\underline{Z}_g + \underline{Z}_{AB}} = 1 = 1 \cdot e^{j0}\text{ A}$

$i(t) = \sqrt{2} \cdot \cos(1000t)\text{ A}$

c) $\underline{U} = \underline{I} \cdot \underline{Z}_{AB} = (12 - j4)\text{ V} = 12.65 \cdot e^{-j18.43^\circ}\text{ V}$

$u(t) = 17.88 \cdot \cos(1000t - 18.43^\circ)\text{ V}$

d) $\underline{S} = \underline{E} \cdot \underline{I}^* = (20 + j0)\text{ VA} = 20\text{ VA}$