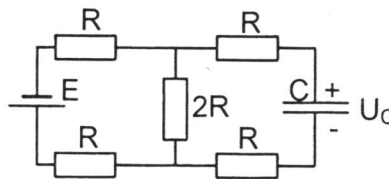


Popravni prvi kolokvijum iz Elektrotehnike, 19.1.2023.

Ime i prezime, smer, broj indeksa

1. Napon  $U_C$  kondenzatora C u kolu sa slike iznosi:



A)  $U_C = -2E/3$

B)  $U_C = -E/2$

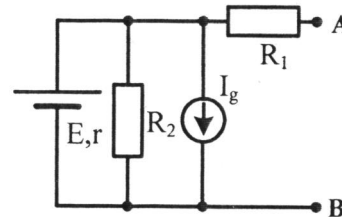
C)  $U_C = 2E/3$

D)  $U_C = E/3$

2. Na slici je prikazan deo složenog kola, sa poznatim parametrima:

$I_g = 1A$ ,  $E = 12V$ ,  $R_1 = R_2 = 12\Omega$  i  $r = 6\Omega$ . Parametri

Tevenenovog generatora, između tačaka A i B, su:



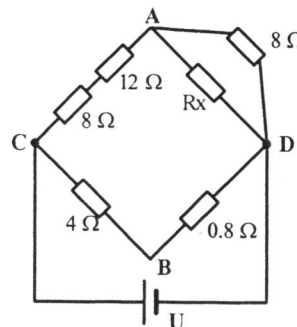
A)  $E_T = 12V, R_T = 24\Omega$

B)  $E_T = -12V, R_T = 16\Omega$

C)  $E_T = -4V, R_T = 24\Omega$

D)  $E_T = 4V, R_T = 16\Omega$

3. Ako je Vitstonov most sa slike u ravnoteži, tj.  $U_{AB} = 0$ , nepoznata otpornost  $R_X$  iznosi:



A)  $4\Omega$

B)  $8\Omega$

C)  $16\Omega$

D)  $24\Omega$

4. Kondenzator kapaciteta  $4mF$  opterećen je tako da napon na njegovim krajevima iznosi  $50V$ . Ako se paralelno ovom kondenzatoru veže drugi neopterećeni kondenzator kapaciteta  $16mF$ , napon na krajevima ovakve veze iznosi:

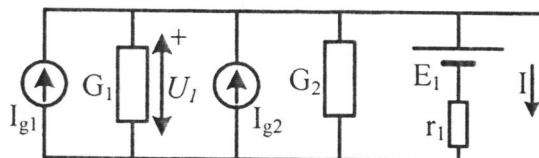
A)  $10V$

B)  $50V$

C)  $25V$

D)  $12.5V$

5. U električnom kolu na slici poznate su struje strujnih generatora  $I_{g1}$ ,  $I_{g2}$ , kao i ems generatora  $E_1$  i njegova unutrašnja otpornost  $r_1$ . Struja  $I$  i napon  $U_1$  na provodnosti  $G_1$  iznose:



A)  $I = I_{g1} + I_{g2} + \frac{E}{r_1}$   
 $U_1 = 0$

B)  $I = \frac{E}{r_1}$ ,  $U_1 = 0$

C)  $I = I_{g1} + I_{g2} + \frac{E}{r_1}$   
 $U_1 = \frac{I_{g1} + I_{g2}}{G_1 + G_2}$

D)  $I = I_{g1} + I_{g2} + \frac{E}{r_1}$   
 $U_1 = I_{g1} / G_1$

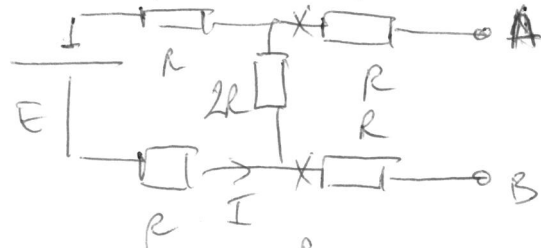
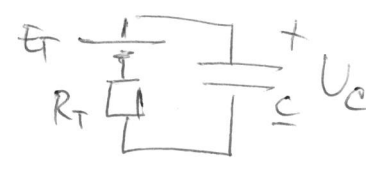
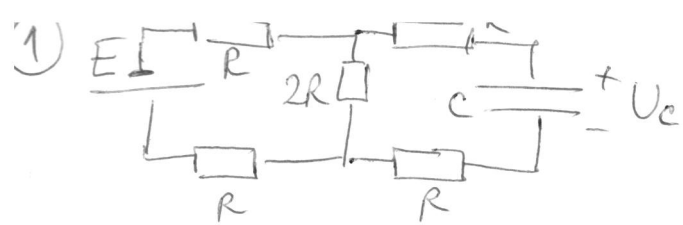
6. Kada se dva kondenzatora vežu u rednu vezu, ekvivalentna kapacitivnost iznosi  $8\mu F$ , a kada se vežu paralelno, ekv. kapacitivnost iznosi  $50\mu F$ . Kapacitivnosti kondenzatora iznose:

A)  $10\mu F, 5\mu F$

B)  $10\mu F, 40\mu F$

C)  $100\mu F, 100\mu F$

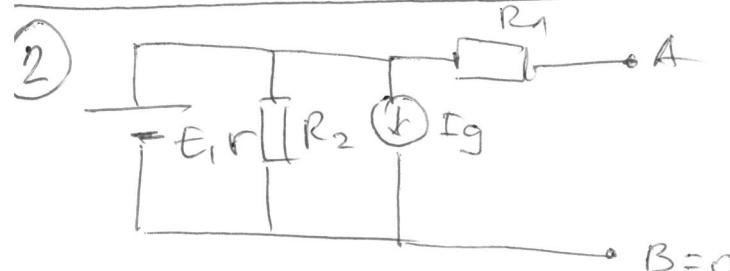
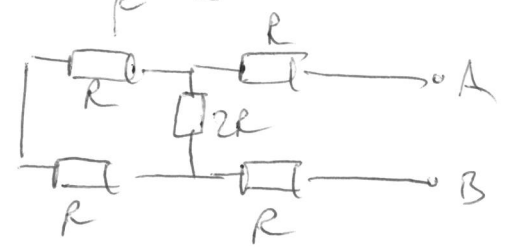
D)  $20\mu F, 30\mu F$



$$I = \frac{E}{4R} \quad E_T = U_{AB}^{ov} = -2RI = -\frac{E}{2}$$

$$R_T = R + 2R \parallel 2R + R = 3R$$

$$U_C = E_T = -\frac{E}{2} \quad \text{(B)}$$

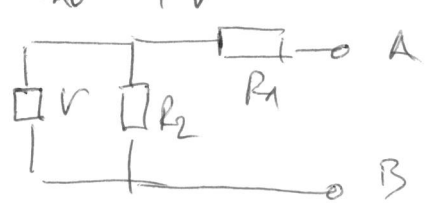


$$U_{AO} \left( \frac{1}{r} + \frac{1}{R_2} \right) = \frac{E}{r} - I_g$$

$$U_{AO} = \frac{E/r - I_g}{\frac{1}{r} + \frac{1}{R_2}}$$

$$E_T = U_{AO} = 4V$$

$$U_{AO} = \frac{\frac{12}{6} - 1}{\frac{1}{6} + \frac{1}{12}} = \frac{2-1}{\frac{2+1}{12}} = \frac{12}{3} = 4$$



$$R_T = R_1 + r \parallel R_2 = 12 + \frac{6 \cdot 12}{6+12} = 12 + 4 = 16 \Omega$$

$$E_T = 4V, R_T = 16 \Omega \quad \text{(D)}$$

③

$$(8+12) \cdot 0,8 = 4 \cdot \left( \frac{R_x \cdot 8}{R_x + 8} \right)$$

$$\frac{8R_x}{R_x + 8} = \frac{20 \cdot 0,8}{1} = 4$$

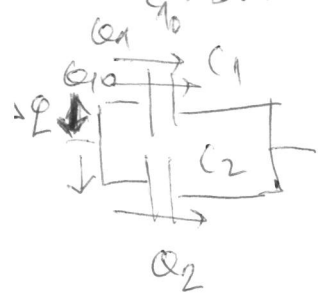
$$8R_x = 4R_x + 32$$

$$4R_x = 32$$

$$R_x = 8 \Omega$$

$$\text{(B)}$$

4)  $C_1 = 4 \mu\text{F}$   
 $U_{C_1} = 50\text{V}$  }  $\Rightarrow Q_{10} = C_1 \cdot U_{C_1} = 200 \mu\text{C}$



$C_2 = 16 \mu\text{F}$

$U_1 = U_2$   
 $\frac{Q_1}{C_1} = \frac{Q_2}{C_2}$

$Q_1 = Q_{10} - \Delta Q$   
 $Q_2 = \Delta Q$

$\frac{Q_{10} - \Delta Q}{C_1} = \frac{\Delta Q}{C_2} \Rightarrow \Delta Q = \frac{Q_{10}}{\frac{1}{C_1} + \frac{1}{C_2}}$

$\Delta Q = \frac{200 \mu\text{C}}{\frac{1}{4 \mu\text{F}} + \frac{1}{16 \mu\text{F}}} = \frac{50}{\frac{4+1}{16 \mu\text{F}}} = \frac{16 \mu\text{F} \cdot 50}{5} = 160 \mu\text{C}$

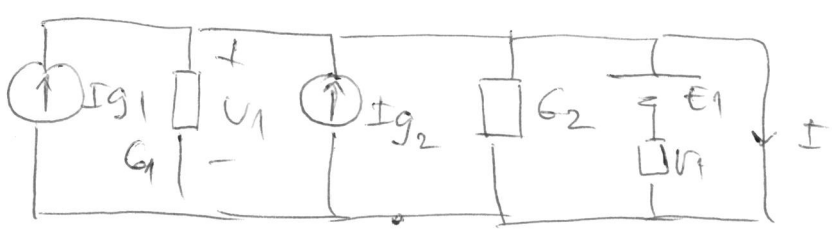
$Q_2 = \Delta Q = 160 \mu\text{C}$

$U_2 = U_1 = \frac{Q_2}{C_2} = \frac{160 \mu\text{C}}{16 \mu\text{F}} = 10\text{V}$

$U_{C_1} = U_{C_2} = 10\text{V}$

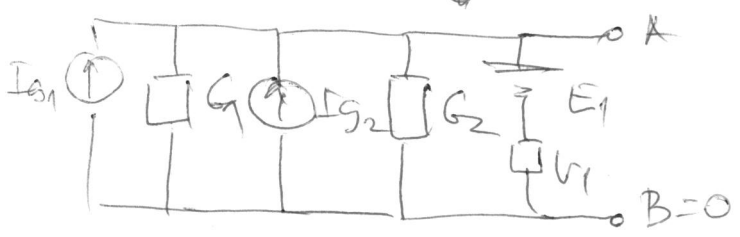
A

5



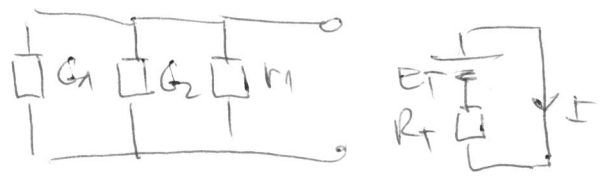
$U_1 = 0$

A



$U_{AO} (G_1 + G_2 + \frac{1}{R_1}) = I_{g1} + I_{g2} + \frac{E_1}{R_1}$

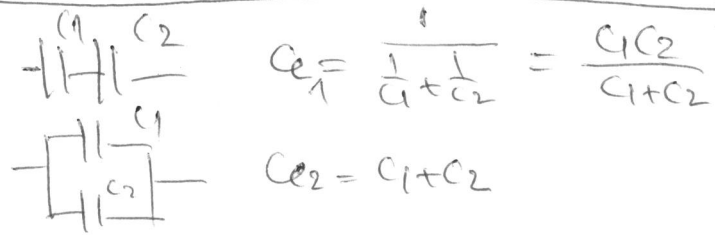
$E_T = U_{AO} = \frac{I_{g1} + I_{g2} + E_1/R_1}{G_1 + G_2 + 1/R_1}$



$R_T = R_1 \parallel \frac{1}{G_1} \parallel \frac{1}{G_2} = \frac{1}{\frac{1}{R_1} + G_1 + G_2}$

$I = \frac{E_T}{R_T} = I_{g1} + I_{g2} + E_1/R_1$

6



$C_{e1} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}} = \frac{C_1 C_2}{C_1 + C_2}$

$C_{e2} = C_1 + C_2$

$C_1 = 10 \mu\text{F}$   
 $C_2 = 40 \mu\text{F}$

B

$C_{e2} = C_1 + C_2 = 50 \mu\text{F}$

$C_{e1} = \frac{C_1 C_2}{C_1 + C_2} = \frac{10 \cdot 40}{10 + 40} = \frac{400}{50} = 8 \mu\text{F}$