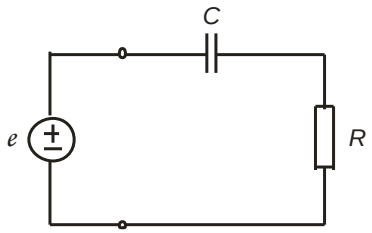
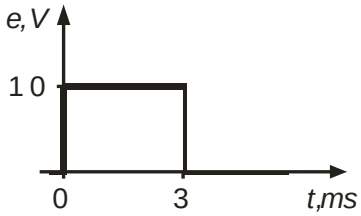
15.11.2006., Zagreb

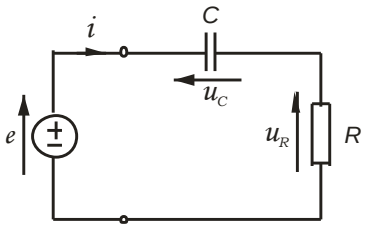
4. domaća zadaća iz Osnova elektrotehnike i elektronike

1. Ulazni napon kao sa slike priključen je na *RC*-spoj. Napišite izraze za napon na otporniku u intervalima od 0 do 3 ms i od 3 ms do ∞ te ga nacrtajte. Poznato je: R = 47 kΩ, C = 33 nF.



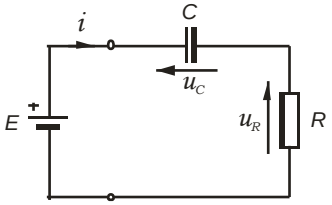


Rješenje:



$$e = u_C + u_R$$

$0 \le t \le 3\ ms$



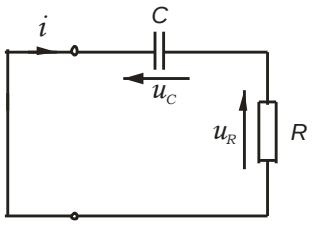
$$e = 10\ V = E, \qquad \tau = RC = 1{,}551\ ms$$

$$u_C = E \cdot \left(1 - e^{-\frac{t}{\tau}}\right) = 10 \cdot \left(1 - e^{-\frac{t}{1{,}551 \cdot 10^{-3}}}\right)$$

$$u_R = E \cdot e^{-\frac{t}{\tau}} = 10 \cdot e^{-\frac{t}{1{,}551 \cdot 10^{-3}}}$$

$$u_C(3\ ms) = 10 \cdot \left(1 - e^{-\frac{3}{1{,}551}}\right) = 10 \cdot (1 - 0{,}1445) = 8{,}555\ V$$

$t > 3\ ms$



$$0 = u_C + u_R, \qquad \tau = RC = 1{,}551\ ms$$

$$u_C = u_C(t = 3\ ms) \cdot e^{-\frac{t - 3 \cdot 10^{-3}}{\tau}} = 8{,}555 \cdot e^{-\frac{t - 3 \cdot 10^{-3}}{1{,}551 \cdot 10^{-3}}}$$

$$u_R = -u_C$$

$$u_R = -8{,}555 \cdot e^{-\frac{t - 3 \cdot 10^{-3}}{1{,}551 \cdot 10^{-3}}}$$

Prikaz napona u krugu.