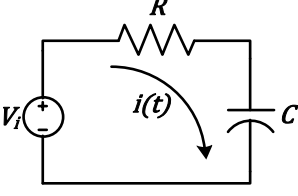
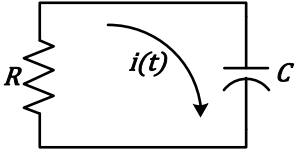


RC DEVRESİ	
Şarj durumu	Deşarj durumu
	
$V_i = R \cdot \frac{di(t)}{dt} + V_c(t)$ $\frac{dv_c(t)}{dt} + \frac{1}{RC} v_c(t) = \frac{1}{RC} V_i$ $v_c(t) = V_i \left\{ 1 - e^{-\frac{t}{RC}} \right\}$	$R \cdot \frac{di(t)}{dt} + V_c(t) = 0$ $\frac{dv_c(t)}{dt} + \frac{1}{RC} v_c(t) = 0$ $v_c(t) = V_0 e^{-\frac{t}{RC}}$

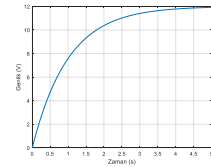
#### Diferansiyel denklemin analitik çözümü

```
syms vc(t) R C Vi Vco
dd=diff(vc,t)+(1/(R*C))*vc(t)==(1/(R*C))*Vi;
vc=dsolve(dd,vc(0)==Vco)
```

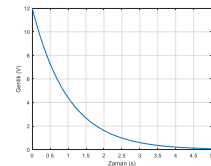
```
syms vc(t) R C Vi Vco
dsolve(R*C*diff(vc,t)+vc==Vi,vc(0)==Vco)
```

```
syms Vi R C Vco real
syms vc(t)
vct=dsolve((Vi-vc)/R-C*diff(vc,t),vc(0)==Vco)
vct = Vi + exp(-t/(C*R))*(Vco - Vi)
```

```
syms vc(t)
R=1e6; C=1e-6; to=R*C; Vi=12; Vco=0;
dd=diff(vc,t)+(1/(to))*vc(t)==(1/(to))*Vi;
vc=dsolve(dd,vc(0)==Vco)
fplot(vc,[0,5*to]);
grid on; xlabel('Zaman (s)'); ylabel('Genlik (V)')
```

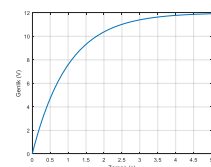


```
syms vc(t)
R=1e6; C=1e-6; to=R*C; Vi=0; Vco=12;
dd=diff(vc,t)+(1/(to))*vc(t)==(1/(to))*Vi;
vc=dsolve(dd,vc(0)==Vco)
fplot(vc,[0,5*to]);
grid on; xlabel('Zaman (s)'); ylabel('Genlik (V)')
```



#### Diferansiyel denklemin sayısal çözümü

```
clear; R=1e6; C=1e-6; Vi=12; Vco=0;
dd=@(t,vc) (Vi-vc)/(R*C);
[t,vc]=ode45(dd,[0 5],Vco);
plot(t,vc)
grid on; xlabel('Zaman (s)'); ylabel('Genlik (V)')
```



**s-domeni**

$$I(s) = \frac{V_i(s)}{R + \frac{1}{sC}}$$

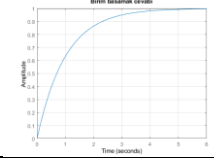
$$V_o(s) = I(s) \cdot \frac{1}{sC} = \frac{V_i(s)}{R + \frac{1}{sC}} \cdot \frac{1}{sC}$$

$$\frac{V_o(s)}{V_i(s)} = \frac{1}{s + \frac{1}{RC}}$$

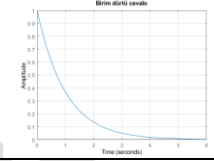
```
clear; R=1e6; C=1e-6;
sistem=tf([1],[1 1/(R*C)])
```

```
sistem =
1
-----
s + 1
```

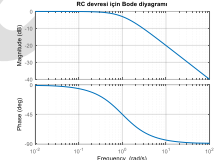
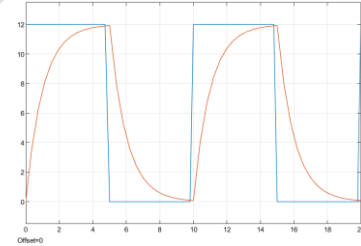
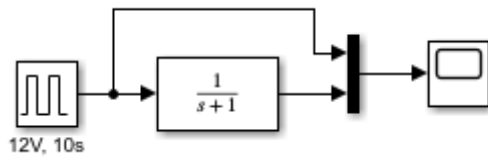
```
clear; R=1e6; C=1e-6;
sistem=tf([1],[1 1/(R*C)])
step(sistem);
grid on; title('Birim basamak cevabı')
```



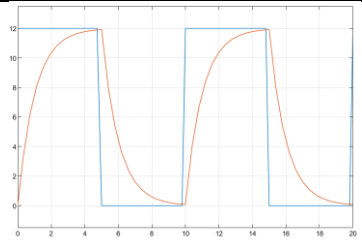
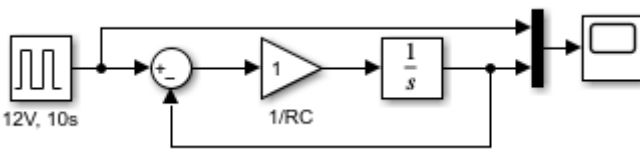
```
clear; R=1e6; C=1e-6;
sistem=tf([1],[1 1/(R*C)])
impz(sistem);
grid on; title('Birim dürtü cevabı')
```



```
clear; R=1e6; C=1e-6;
sistem=tf([1],[1 1/(R*C)])
bode(sistem);
grid on; title('RC devresi için Bode diyagramı')
```

**SIMULINK***Transfer fonksiyonu*

$$\text{Diferansiyel denklem } \frac{dv_c(t)}{dt} = \frac{1}{RC} \{V_i - v_c(t)\}$$

**SIMSCAPE**