1.Root locus

```
clc;clear;close all;
num=input('enter the numerator coefficients');
den=input('enter the denominator coefficients');
t=tf(num,den)
rlocus(t);
```

2.Bodeplot

```
clc;clear;close all;
k=input('enter the gain=');
z=input('enter the zeros=');
p=input('enter the poles=');
sys=zpk(z,p,k);
t=tf(sys)
bode(sys);
grid;
[Gm,Pm,Wgc,Wpc] = margin(sys);
fprintf('gain margin is %f\n',Gm);
fprintf('phase margin is %f\n',Pm);
fprintf('gain cross over frequency is %f\n',Wgc);
fprintf('phase cross over frequency is %f\n',Wpc);
```

3.Nyquist plot

```
clc;clear;close all;
num=input('enter the numerator coefficients---->');
den=input('enter the denominator coefficients---->');
sys=tf(num,den)
nyquist(sys)
title('Nyquist Plot');
[Gm,Pm,Wgc,Wpc]=margin(sys);
disp(Gm);
disp(Pm);
disp(Wgc);
disp(Wpc);
```

4.Half wave rectifier with r load

```
clc;
clear;close all;
t=linspace(0,1);
em=230*sqrt(2);
r=2;
vs=em*sin(2*pi*t);
vO=vs.*(vs>=0);
iO=vO/r;
vd=vs-vO;
subplot(2,1,1);
plot(t,vs);
title('Half wave rectifier with R load');
xlabel('time');
ylabel('amplitude');
grid;
subplot(2,1,2);
plot(t, vO, '-',t,iO,'--',t,vd);
xlabel('time');
ylabel('amplitude');
legend('v0','i0','vd');
grid;
```

5. Half wave rectifier with l load

```
clc;
clear all;
close all;
t=linspace(0,1,250);
em=230*sqrt(2);
omega=1.0;
es=em*sin(2*pi*t);
vO=es.*(es>=0);
th=t(2)-t(1);
iO=cumsum(es/omega)*th;
subplot(2,1,1);
plot(t,es);
title('Half wave rectifier with L load');
xlabel('time');
ylabel('amplitude');
grid;
subplot(2,1,2);
plot(t, vO, '-',t,iO,'--');
xlabel('time');
ylabel('amplitude');
legend('v0','i0');
grid;
```

6. Half wave rectifier with rl load

```
clc;clear;close all;
r=input('enter the value of the load resistance in ohms=');
xl=input ('enter the value of load inductance reactance in (ohms) =');
t=linspace(0,4*pi);
em=230*sqrt(2);
wt=atan(xl/r);
vs=em*sin(t);
z=sqrt(r^2+xl^2);
iO=em/(z)*(sin(wt)*exp(-r*t/1)+sin(t-wt));
vO=vs.*(iO>=0);
iO=iO.*(0>=0);
vd=(vs-vO);
plot (t, vO, '-',t,iO,'--',t,vd,':');
xlabel ('frequency');
ylabel('amplitude');
legend ('vO','iO', 'vd');
title ('Half wave rectifier with RL load');
grid;
```

7. Half wave controlled rectifier with r load

```
clc; clear all;close all;
alphal=input('enter the value of delay angle in degree=');
alpha=alphal*pi/180;
t1=linspace(0,alpha,1024);
t2=linspace(alpha,pi,1024);
t3=linspace(pi,2*pi,1024);
t=[t1 t2 t3];
em=230*sqrt(2);
r=15;
v0=[0*sin(t1) em*sin(t2) em* sin(t3)];
i0=v0/r;
plot(t, v0,'-',t,i0,'--');
xlabel('conduction angle');
ylabel('output voltage (VO) & current (i0)');
title('Half wave bridge controlled rectifier with r load');
grid;
legend('v0','io');
```

8. full wave controlled rectifier with r load

```
clc;clear all;close all;
em=230*sqrt(2);
alphal=input('enter the delay angle at which thyristor is trigger
degree=');
alpha=alphal*pi/180;
r=2;
t0=linspace(0,alpha,256);
t1=linspace(alpha,pi,256);
t2=linspace(pi,pi+alpha,256);
t3=linspace(pi+alpha,2*pi,256);
t=[t0 t1 t2 t3];
vdc=(em/pi)*(1+cos(alpha));
v0=[0*sin(t0) em*sin(t1) 0*sin(t2) -em*sin(t3)];
i0=v0/r;
vth1=[em*sin(t0) 0*em*sin(t1) em*sin(t2) em*sin(t3)];
plot(t,v0,'-',t,i0,'--',t,vth1,'-.',t, vdc);
xlabel('cycle');
ylabel('magnitude');title(' Full Wave Bridge Controlled Rectifier with R
Load');
grid;
legend('v0','i0','vth1','vdc');
```

9. full wave controlled rectifier with rl load

```
clc;clear all; close all;
em=230*sqrt(2);
alphal=input('enter the delay angle at which thyristor is trigger
degree=');
alpha=alphal*pi/180; td=pi/256;
r=2;
l=0.08;
omegal=2*pi*50*l;
t0=linspace(0,alpha,256);
t1=linspace(alpha,pi,256);
t2=linspace(pi,pi+alpha,256);
t3=linspace(pi+alpha,2*pi,256);
t=[t0 t1 t2 t3];
vdc=2*(em/pi)*cos(alpha);
v0=[0*sin(t0) em*sin(t1) em*sin(t2) -em*sin(t3)];
vth1=[em*sin(t0) 0*em*sin(t1) 0*sin(t2) em*sin(t3)];
plot(t,v0,'-',t,vth1,'--',t,vdc,'-.');
xlabel('frequncy');
ylabel ('magnitude');
grid;
legend('v0','vth1','vdc');
title('Full Wave Bridge Controlled Rectifier with RL Load');
```

10.step response of 2nd order system

```
clc;clear all;close all;
t=linspace(0,12,100);
c=zeros(size(t));
zeta=0:0.2:1;
for n=1:6
    num_cof=[0 0 1];
    den_cof=[1 2*zeta(n) 1];
    c(1:100,n)=step(num_cof,den_cof,t);
end
plot(t,c);grid on;
xlabel('time in sec');
ylabel('unit step response c(t)');
text(2.8,1.8,'\zeta=0');
text(2.8,1.5,'\zeta=0.2');
text(2.8,1.3,'\zeta=0.4');
text(2.8,1.1,'\zeta=0.6');
text(2.8,0.9,'\zeta=0.8');
text(2.8,0.7,'\zeta=1.0');
legend('\zeta=0','\zeta=0.2','\zeta=0.4','\zeta=0.6','\zeta=0.8',
'\zeta=1.0');
```

11.Transfer function of two systems

```
clc;clear;close all;
disp('system 1');
num_cof1=[0 0 8];den_cof1=[1 2 9];
g1=tf(num_cof1,den_cof1)  %#ok<*NOPTS>
disp('system 2');
num_cof2=[0 4];den_cof2=[1 6];
g2=tf(num_cof2,den_cof2)
disp('---------------cascade system---------------');
[num_cofc,den_cofc]=series(num_cof1,den_cof1,num_cof2,den_cof2);
gc=tf(num_cofc,den_cofc)
disp('---------------parallel system---------------');
[num_cofp,den_cofp]=parallel(num_cof1,den_cof1,num_cof2,den_cof2
);
gp=tf(num_cofp,den_cofp)
disp('---------------Feedback system---------------');
[num_coff,den_coff]=feedback(num_cof1,den_cof1,num_cof2,den_cof2
);
gf=tf(num_coff,den_coff)
```

12.series resonance

```
clc;clear ;close all;
r=input('Enter the resistance value----->');
l=input('Enter the inductance value------>');
c=input('Enter the capacitance value----->');
v=input('Enter the input voltage------->');
f=linspace(0,300);
XL=2*pi.*f*l;
XC=(1./(2*pi.*f*c));
x=XL-XC;
z=sqrt((r^2)+(x.^2));
i=v./z;
subplot(2,2,1);
plot(f,XL);
grid;
xlabel('frequency');ylabel('XL');title('frequency vs reactance XL');
subplot(2,2,2);
plot(f,XC);
grid;
xlabel('frequency');ylabel('XC');title('frequency vs reactance XC');
subplot(2,2,3);
plot(f,z);
grid;
xlabel('frequency');ylabel('Z');title('frequency vs Impedance Z');
subplot(2,2,4);
plot(f,i);
grid;
xlabel('frequency');ylabel('I');title('frequency vs current I');
```

13.parallel resonance

```
clc;
clear all;
close all;
r=input('enter the resistance value----->');
l=input('enter the inductance value------>');
c=input('enter the capacitance value----->');
v=input('enter the input voltage------->');
f=linspace(0,50);
xl=2*pi.*f*l;
xc=(1./(2*pi.*f*c));
b1=1./xl;
bc=1./xc;
b=b1-bc;
g=1/r;
y=sqrt((g^2)+(b.^2));
i=v.*y;
subplot(2,2,1);
plot(f,b1);
grid;
xlabel('frequency');
ylabel('BL');
title('frequency vs. BL');
subplot(2,2,2);
plot(f,bc);
grid;
xlabel('frequency');
ylabel('Bc');
title('frequency vs. BC');
subplot(2,2,3);
plot(f,y);
grid;
xlabel('frequency');
ylabel('Y');
title('frequency vs. Y');
subplot(2,2,4);
plot(f,i);
grid;
xlabel('frequency');
ylabel('I');
title('frequency vs. I');
```

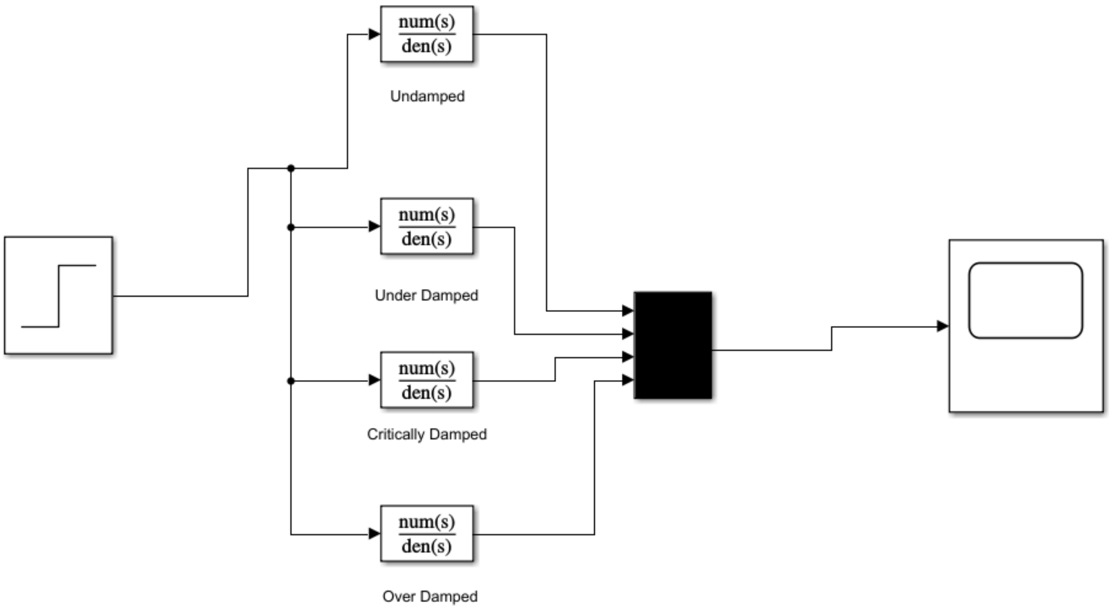
14.ybus formation

```
clc;clear all;close all;
nbus=5;
%          Lp Lq R    X    ysh  tap
linedata=[ 1 2 0.02 0.06 0.03 1
    1 3 0.08 0.24 0.025 1
    2 3 0.06 0.18 0.02 1
    2 4 0.06 0.18 0.02 1
    2 5 0.04 0.12 0.015 1
    3 4 0.01 0.03 0.01 1
    4 5 0.08 0.24 0.025 1
    ];
nline=length(linedata);
i=sqrt(-1);
for k=1:nline
    lp(k)=linedata(k,1);
    lq(k)=linedata(k,2);
    r(k)=linedata(k,3);
    x(k)=linedata(k,4);
    ysh(k)=linedata(k,5);
    a(k)=linedata(k,6);
    z(k)=(r(k)^2+x(k)^2);
    y(k)=1/z(k);
end
ybus=zeros(nbus,nbus);
for k=1:nline
    ylp(k)=(1/a(k)^2-1/a(k))*y(k);
    ylq(k)=(1-1/a(k))*y(k);
    y(k)=y(k)/a(k);
end

for k=1:nline
   ybus(lp(k),lq(k))=ybus(lp(k),lq(k))-y(k);
   ybus(lq(k),lp(k))=ybus(lp(k),lq(k));
   ybus(lp(k),lp(k))=ybus(lp(k),lp(k))+y(k)+ylp(k)+1i*ysh(k);
   ybus(lq(k),lq(k))=ybus(lq(k),lq(k))+y(k)+ylq(k)+1i*ysh(k);

end
ybus
```

15.zbus formation

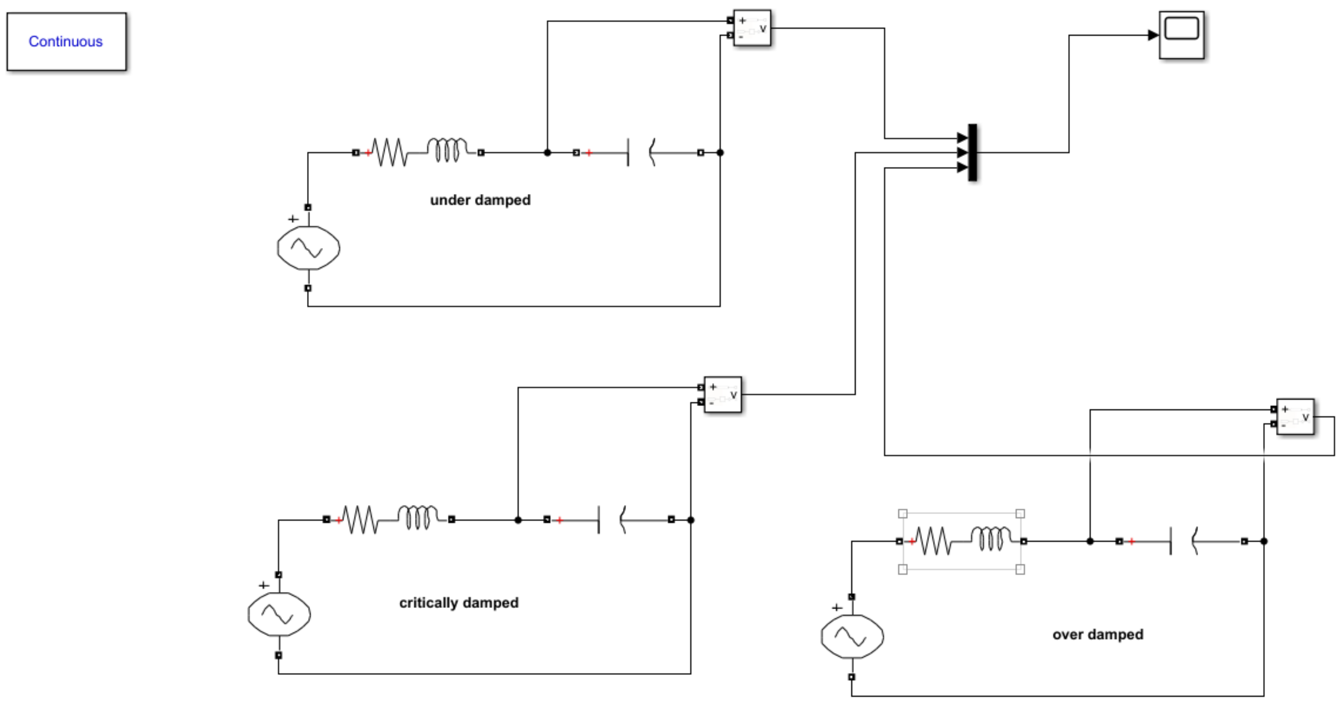
```
clear; clc;close all;
%       e frm to r x
zprime=[ 1 1 0 0 0.11
    2 2 1 0 0.2
    3 3 1 0 0.1
    4 2 0 0 0.11
    5 2 3 0 0.2];

[elements,columns]=size(zprime);
zbus=[];
currentbusno=0;
for k=1:elements
    [rows,cols]=size(zbus);
    from=zprime(k,2);
    to=zprime(k,3);
    x=zprime(k,5);
    newbus=max(from,to);
    ref=min(from,to);
    if newbus>currentbusno && ref==0
        zbus=[zbus zeros(rows,1) ;zeros(1,cols) x];
        currentbusno=newbus;
        continue
    end
    if newbus>currentbusno &&ref~=0
        zbus=[zbus zbus(:,ref);zbus(ref,:)
x+zbus(ref,ref)];
        currentbusno=newbus;
        continue
    end
    if newbus<=currentbusno && ref==0
        zbus=zbus-
(1/(zbus(newbus,newbus)+x))*zbus(:,newbus)*zbus(newbus,:);
        continue
    end
    if newbus<=currentbusno && ref~=0
        zbus=zbus-1/(x+zbus(from,from)+zbus(to,to)-
2*zbus(from,to))*(zbus(:,from)-zbus(:,to))*(zbus(from,:)-
zbus(to,:));
    end
end
zbus
```

16.transient response

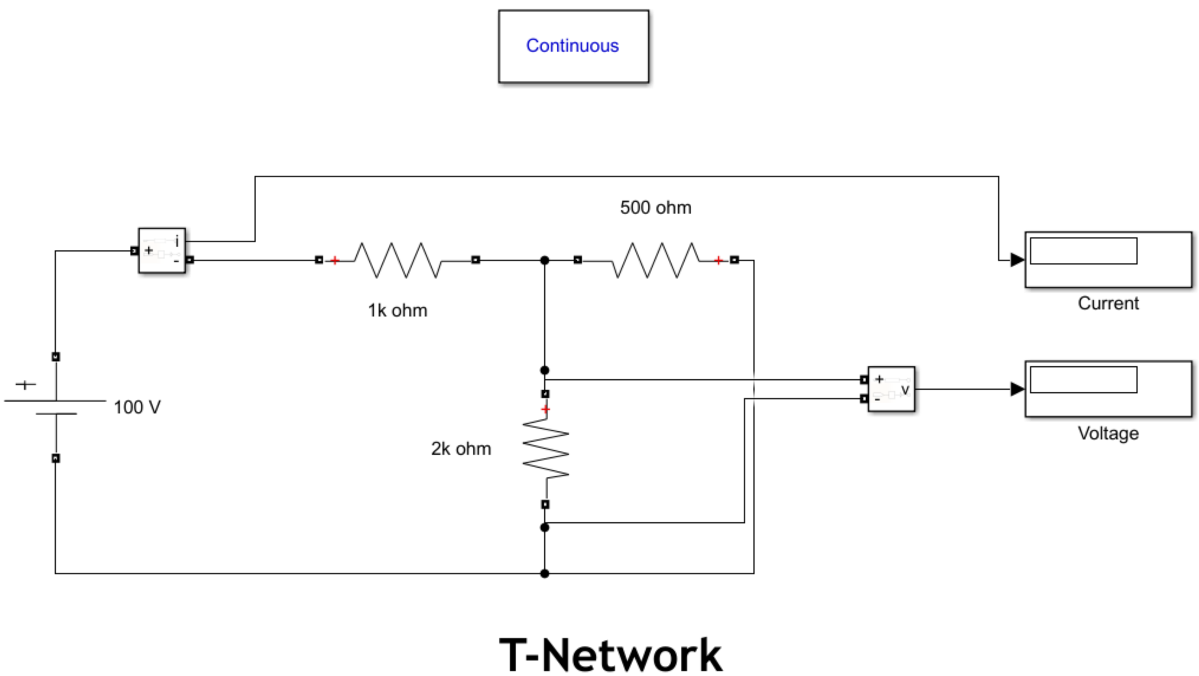


Transient Response

16.unit step response rlc circuit



17. t network



Continuous
500 ohm
1k ohm
100 V
2k ohm
Current
Voltage
T-Network