

---

## Table of Contents

.....	1
program to calculate the diffrential equations solutions .....	1
input sequence .....	1
natural response .....	2
forced response .....	2

```
clc
clear all;
close all;
```

## program to calculate the diffrential equations solutions

```
%y[n]+2y[n-1]=3y[n-2]=x[n]
%to find natural response yn[n], forced response yf[n] and total response
%yt[n] with initial conditons [-n] and y[-2] and input impulse at 0
```

## input sequence

```
N=10
n=0:N-1
disp('input is')
x=(n==0) %impulse at 0
a=[1 2 3] %coefficients of y
b=1 %coefficients of x
ic=[1,-1] %initial conditions
```

*N =*

*10*

*n =*

*0 1 2 3 4 5 6 7 8 9*

*input is*

*x =*

*1 0 0 0 0 0 0 0 0 0*

*a =*

---

```

            1      2      3

    b =

            1

    ic =

            1      -1

```

## natural response

```

yn(1)= -2*ic(1)-3*ic(2);
yn(2)= -2*yn(1)-3*ic(1);

for i=3:N
    yn(i)= -2*yn(i-1)-3*yn(i-2);
end
disp('*****');
disp('natural response=');
disp(yn);

*****
natural response=
            1      -5      7      1      -23      43      -17      -95      241      -197

```

## forced response

```

yf(1)=x(1);
yf(2)=x(2)-2*yf(1);

for k=3:N
    yf(k)=x(k)-2*yf(k-1)-3*yf(k-2);

end
disp('*****');
disp('forced response=');
disp(yf);

% % total response

for d=1:N
    yt(d)=yn(d)+yf(d);
end

disp('*****');
disp('total response=');
disp(yt);
disp('#####')

```

---

```

p=filtic(b,a,ic);
ynatural=filter(b,a,zeros(1,N),p);
disp('*****');
disp('using inbuilt natural is=');
disp(ynatural);

yforced=filter(b,a,x);
disp('*****');
disp('using inbuilt forced is=');
disp(yforced);

for f=1:N
    ytotal(f)=ynatural(f)+yforced(f);
end
disp('*****');
disp('using inbuilt toatl is=');
disp(ytotal);

disp('#####');

%%to plot
n=0:9;
subplot(2,2,1);
stem(n,x);
xlabel('n');
ylabel('x(n)');
title('input sequence x(n)');

subplot(2,2,2);
stem(n,yn);
xlabel('n');
ylabel('x(n)');
title('natural response');

subplot(2,2,3);
stem(n,yf);
xlabel('n');
ylabel('x(n)');
title('forced response');

subplot(2,2,4);
stem(n,yt);
xlabel('n');
ylabel('x(n)');
title('total response');

*****
forced response=
      1      1      1      1      1      1      1      1      1      1

*****
total response=
      2     -4      8      2    -22     44    -16    -94     242    -196

```

---

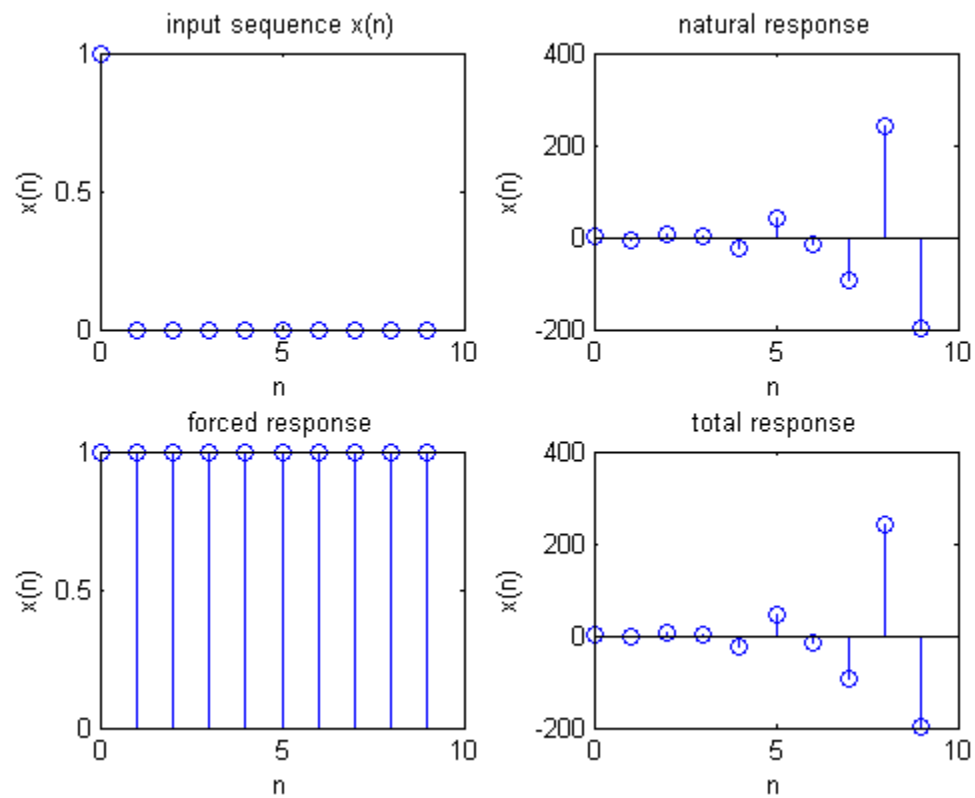
```
#####

*****
using inbuilt natural is=
      1      -5      7      1     -23      43     -17     -95     241     -197

*****
using inbuilt forced is=
      1      -2      1      4     -11      10      13     -56      73      22

*****
using inbuilt toatl is=
      2      -7      8      5     -34      53      -4     -151     314     -175

#####
```



Published with MATLAB® R2014a