Lab: 02

Fall-2022

CSE-3L Control Systems

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Class Section: **B**

"On my honor, as a student of the University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: _____

Submitted to:

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October 20, 2022

Department of Computer Systems Engineering

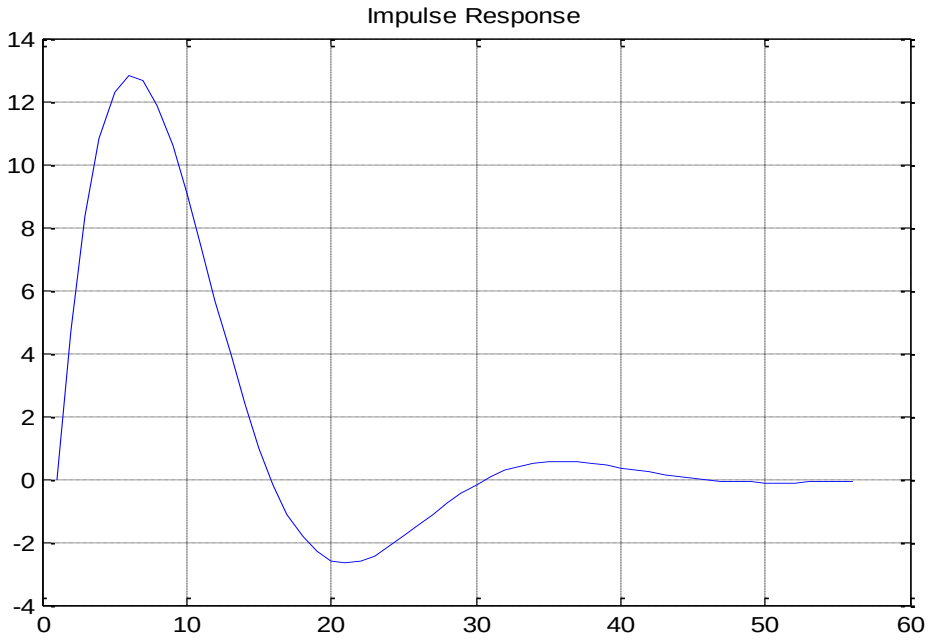
University of Engineering and Technology, Peshawar

Task01: Find the impulse response and step response of the following system by using matlab also use Simulink and then compare both results.

G(s)=100/s^2+4s+20

Source Code:

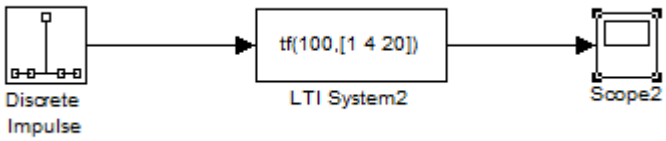
```
clc
clear all
close all
num=100;
denum=[1,4,20];
sys=tf(num,denum);
im=impulse(sys);
st=step(sys);
plot(im);
```



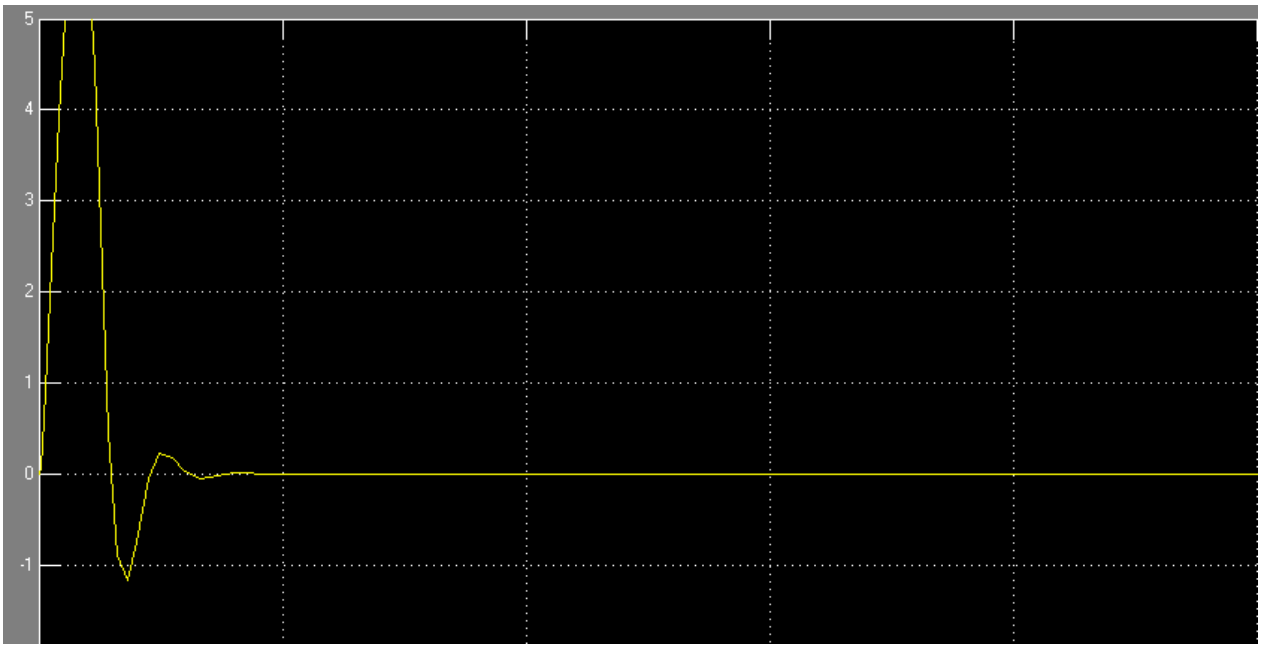

```
title('Impulse Response');
grid on
figure
plot(st);
title('Step response');
grid on
```

Impulse Response:

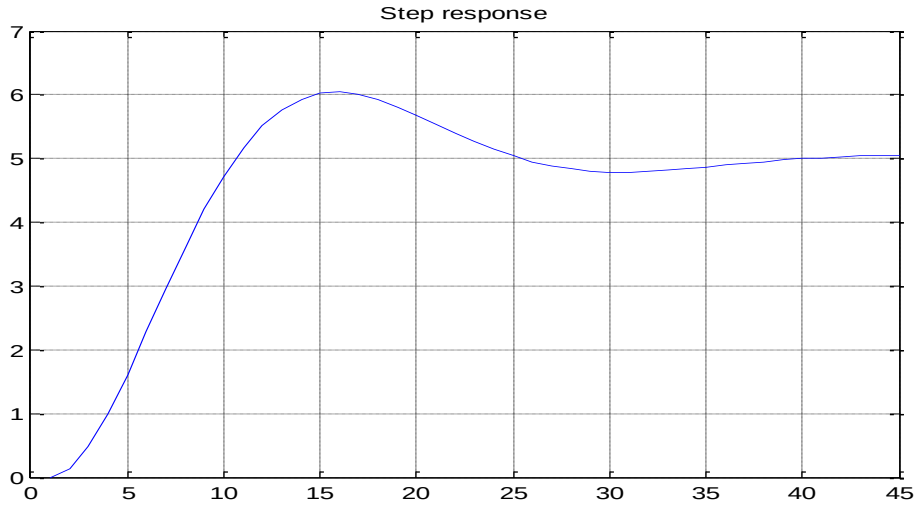
Block Diagram of unit response:



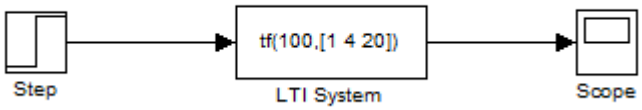
Graph:



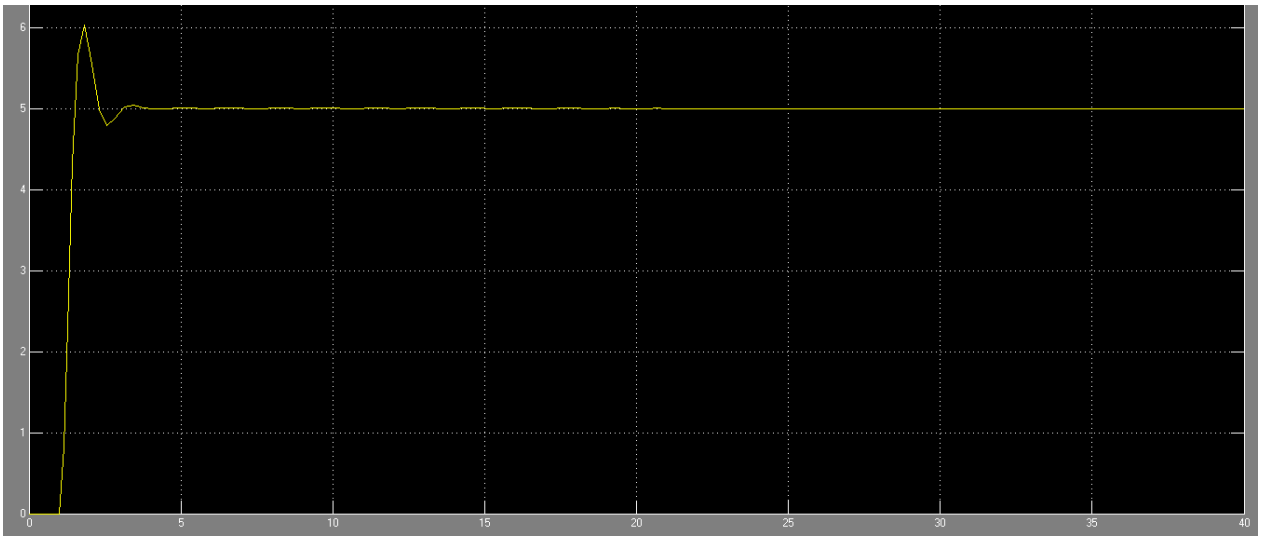
Step response:



Block Diagram of step response:



Graph:

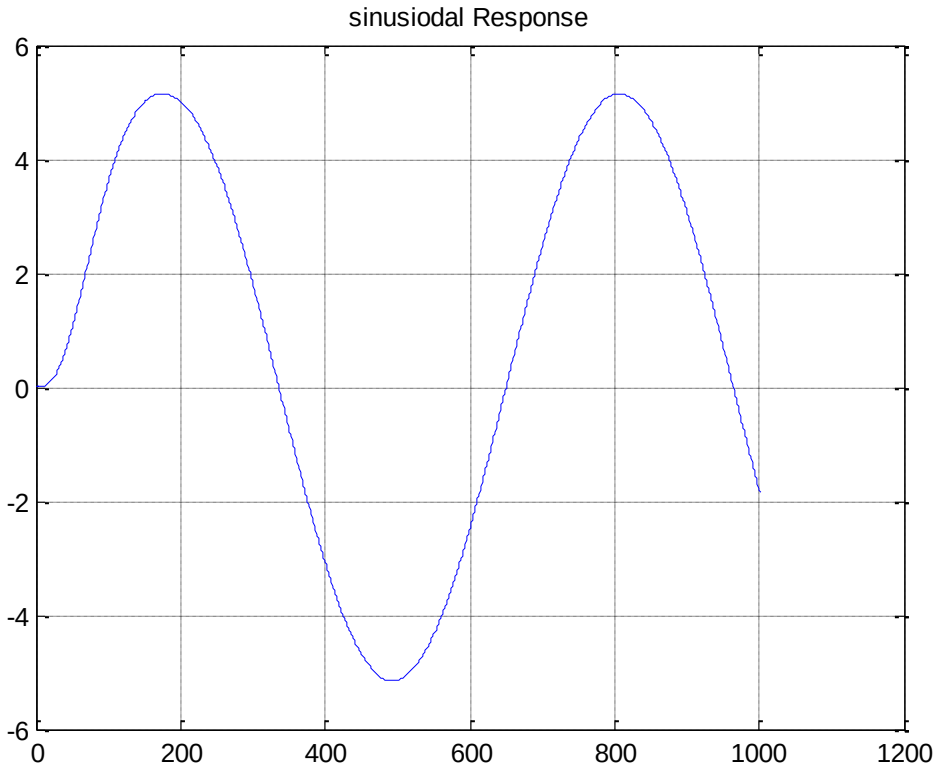


Task02: Also apply sinusoidal input.

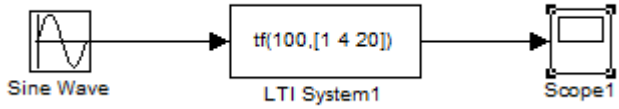
Source Code:

```
clc
clear all
close all
t=0:0.01:10;
u=sin(t);
num=100;
denum=[1 4 20];
sys=tf(num,denum);
y=lsim(sys,u,t);
plot(y);
title('sinusiodal Response');
grid on
```

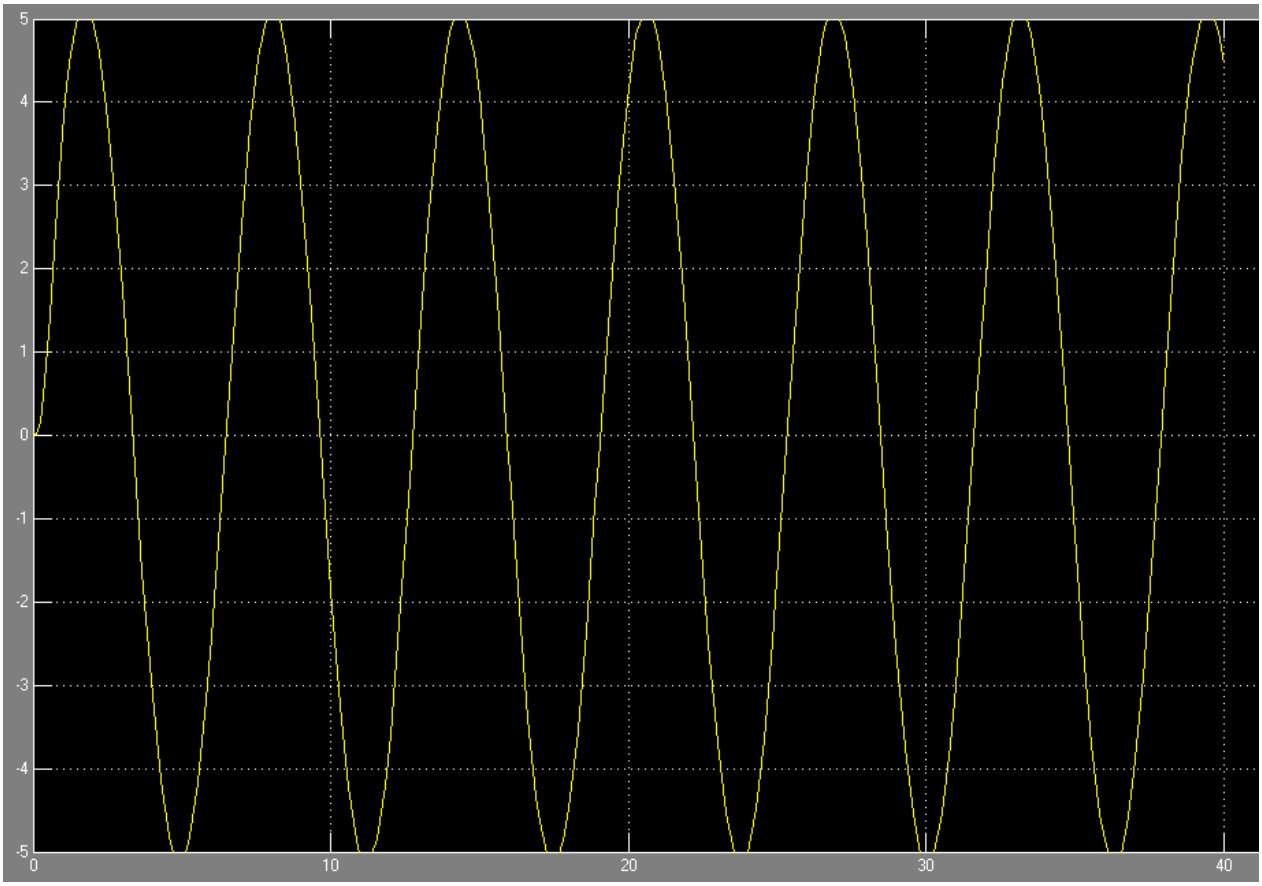
Sinusoidal Response:



Block Diagram of sinusoidal response:



Graph:



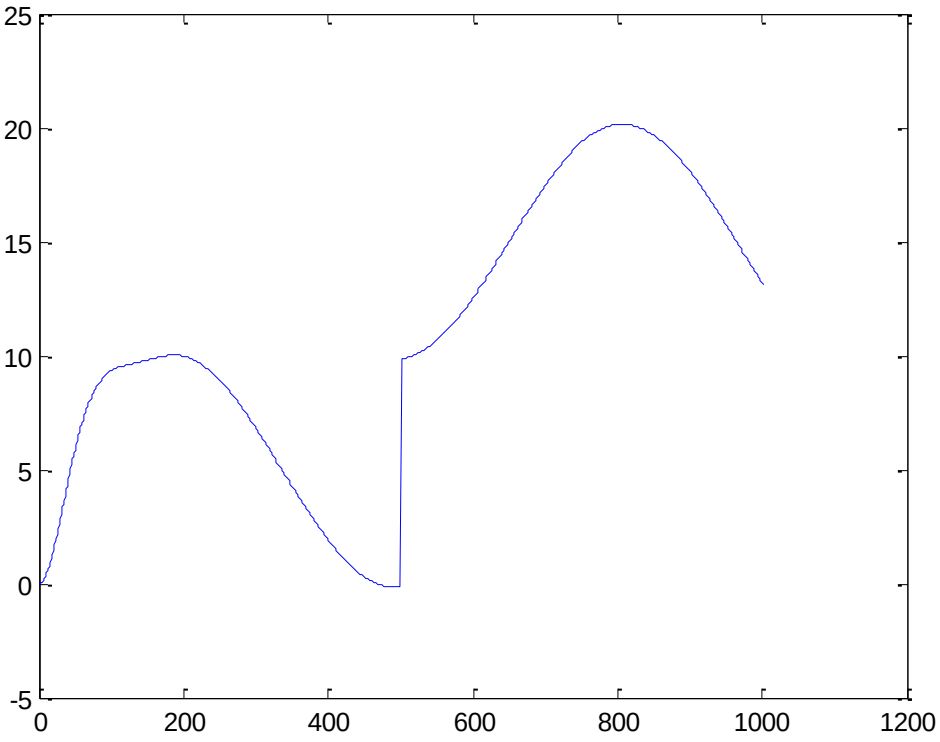
Task03: find system response to the input=sin (2*pi*t) +u (t) + 2u (t-5)

Source code:

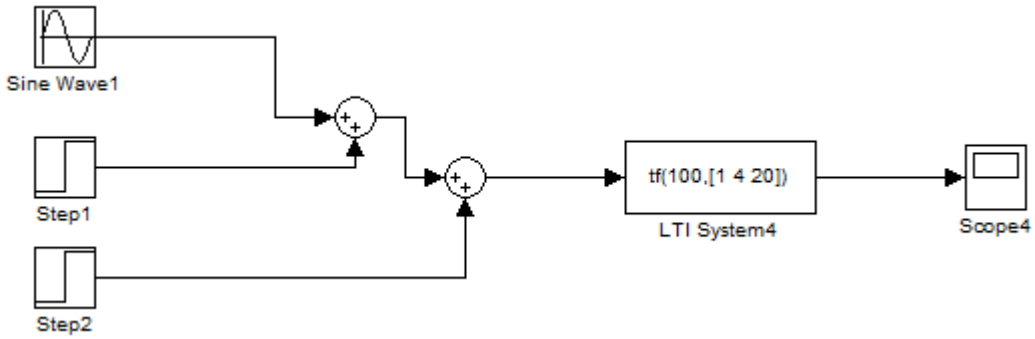
```
clc
clear all
close all
t=0:0.01:10;
u=sin(t);
num=100;
denum=[1 4 20];
sys=tf(num,denum);
```

```
y1=lsim(sys,u,t);   %sin response
y2=step(sys,0:0.01:10); %unit step response
y3=step(sys,5:0.01:10); %unit step response
temp=zeros(500,1);
y3=[temp;y3];   %b/c the size of y3 become = to y1 and y2.
y=y1+y2+2*y3;
plot(y);
```

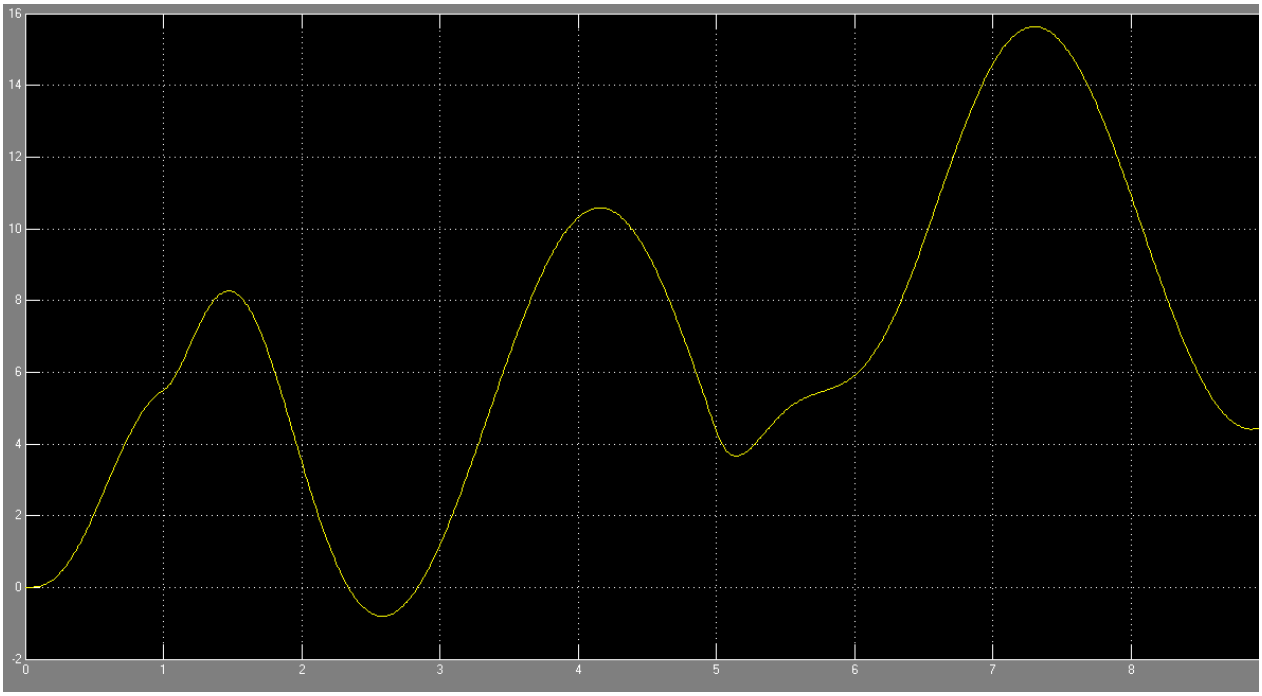
Graph:



Block Diagram:



Graph:

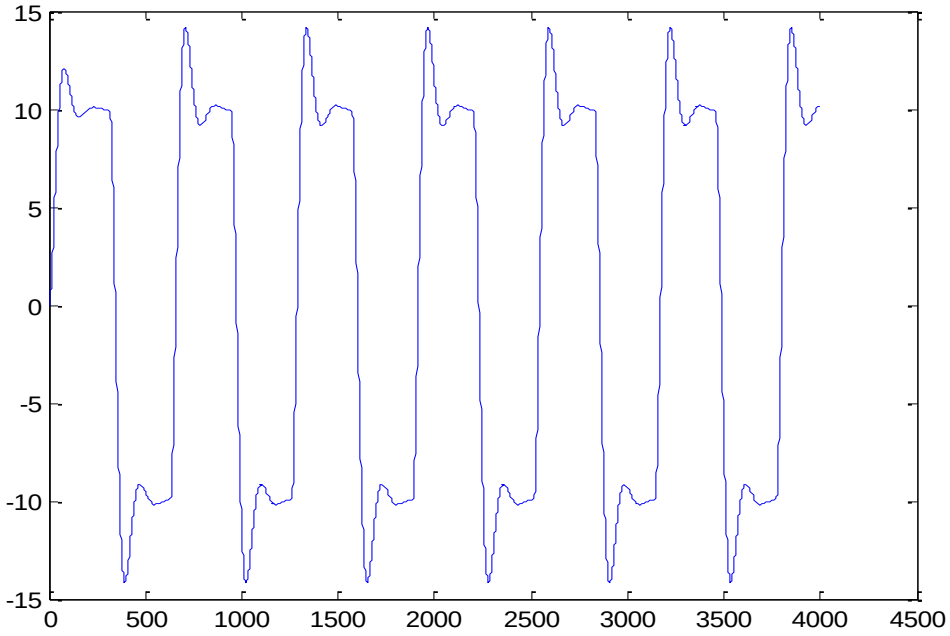


Task04: Square input with amplitude equal to 2 and time period equal to 10. Simulate the system for 40 seconds.

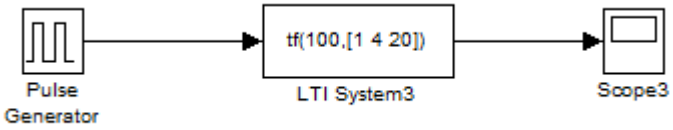
Source code:

```
clc
clear all
close all
t=0:0.01:40;
sq=2*square(t);
num=100;
denum=[1,4,20];
sys=tf(num,denum);
y=lsim(sys,sq,t);
plot(y);
```

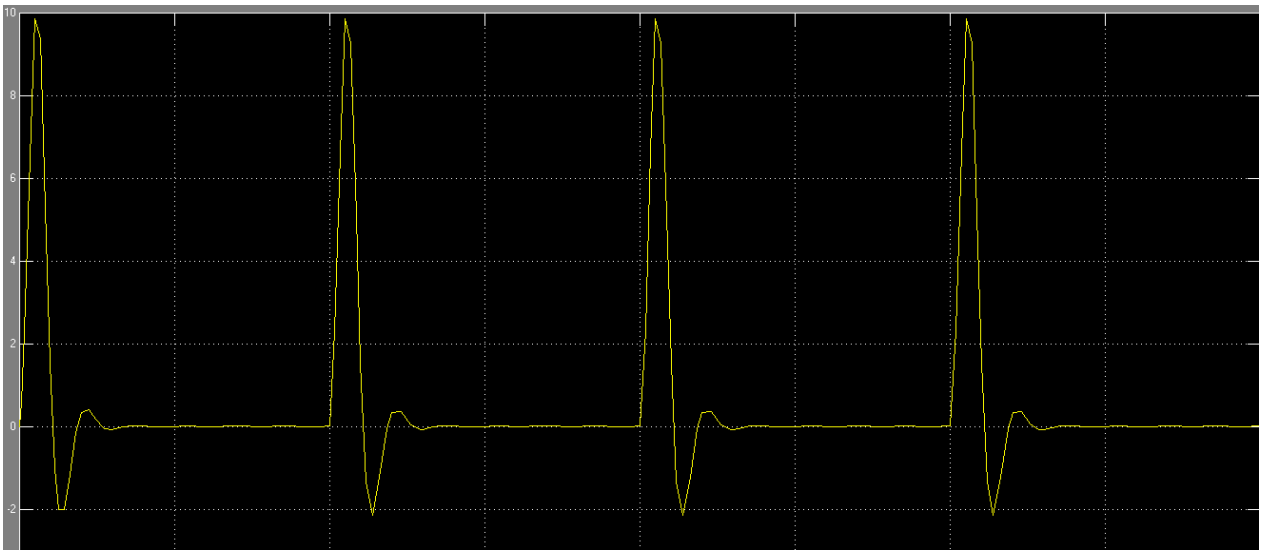
Graph:



Block Diagram of square Function:



Graph:

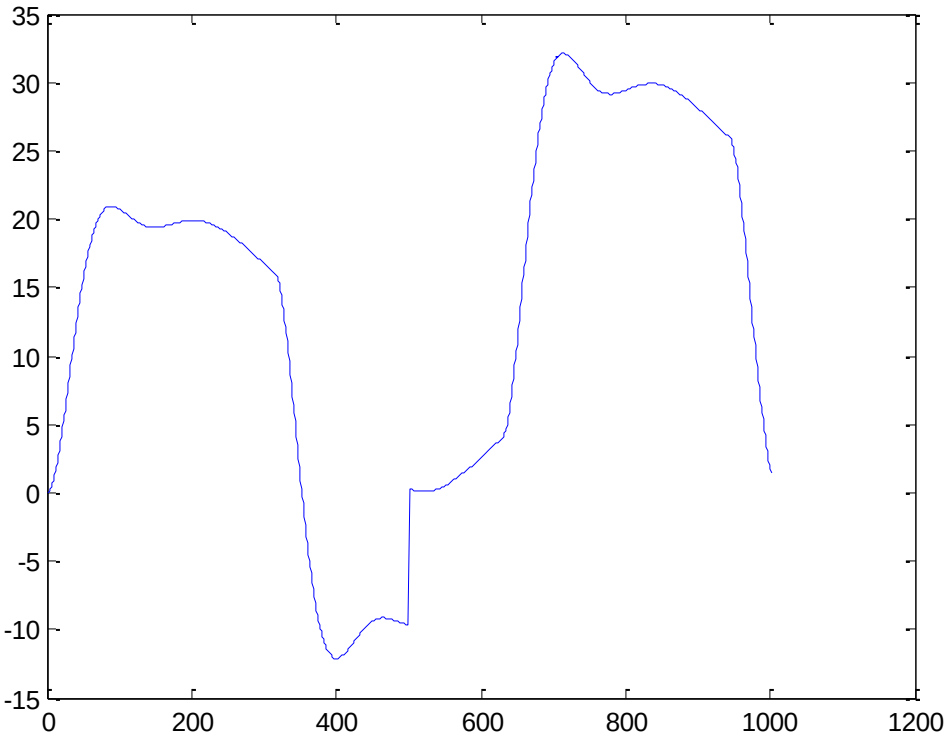


Task05: combine input from Q3 and Q4.

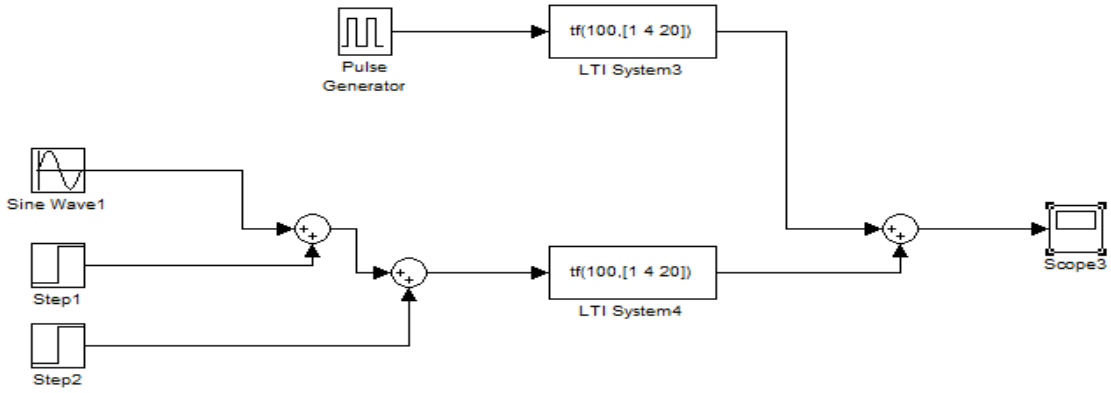
Source Code:

```
clc
clear all
close all

t=0:0.01:10;
u=sin(t);
num=100;
denum=[1 4 20];
sys=tf(num,denum);
y1=lsim(sys,u,t);
y2=step(sys,0:0.01:10);
y3=step(sys,5:0.01:10);
temp=zeros(500,1);
y3=[temp;y3];
yA=y1+y2+2*y3;

sq=2*square(t);
yB=lsim(sys,sq,t);

result=yA+yB;

plot(result);
```

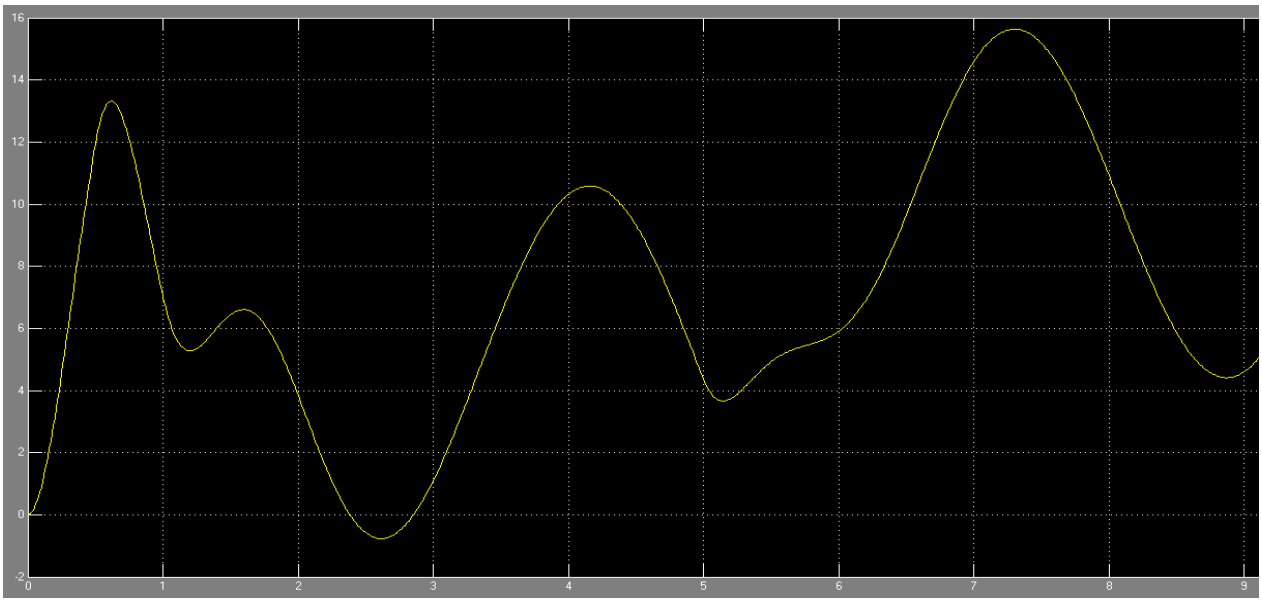
Graph:



Block Diagram:



Graph: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