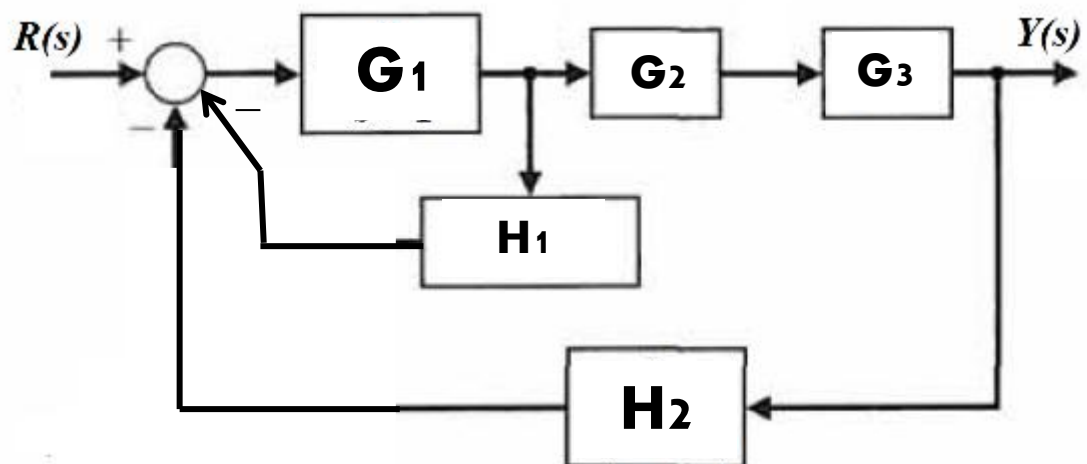
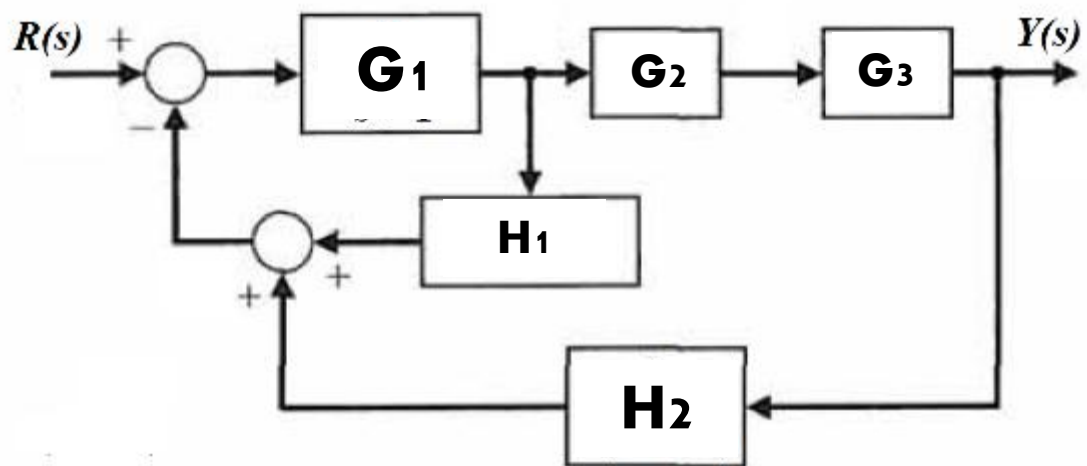
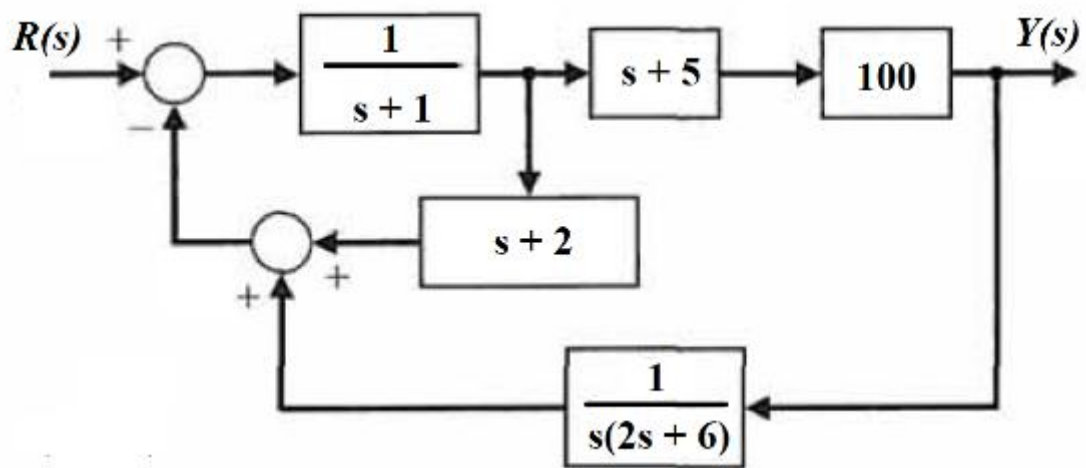




CONTROL SYSTEMS

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201720969



1. Define each block of the block diagram.

Command Window	Command Window
<pre>>> clear all >> num1=[1]; >> den1=[1 1]; >> G1=tf(num1,den1) G1 = 1 ---- s + 1 Continuous-time transfer function. >> num2=[1 5]; >> den2=[1]; >> G2=tf(num2,den2) G2 = s + 5 Continuous-time transfer function. >> num3=[100]; >> den3=[1]; >> G3=tf(num3,den3) G3 = 100 Static gain.</pre>	<pre>>> num4=[1 2]; >> den4=[1]; >> H1=tf(num4,den4) H1 = s + 2 Continuous-time transfer function. >> num5=[1]; >> den5=[2 6 0]; >> H2=tf(num5,den5) H2 = 1 ----- 2 s^2 + 6 s Continuous-time transfer function.</pre>

2. Set the relation between each block such as (parallel, series , feedback, etc...)

NOTE

- *H₁ is feedback for G₁=[sys1]
- *G₂ and G₃ are series=[sys2]
- *sys₁ and sys₂ are series=[sys3]
- *H₂ is feedback for the syst₃=(transfer_function)

Command Window

```
>> sys1=feedback(G1,H1,-1)
```

```
sys1 =
```

$$\frac{1}{2s + 3}$$

Continuous-time transfer function.

```
>> sys2=series(G2,G3)
```

```
sys2 =
```

$$100s + 500$$

Continuous-time transfer function.

```
>> sys3=series(sys1,sys2)
```

```
sys3 =
```

$$\frac{100s + 500}{2s + 3}$$

Continuous-time transfer function.

3. Find the transfer function.

Command Window

```
>> transfer_function=feedback(sys3,H2,-1)
```

```
transfer_function =
```

$$\frac{200 s^3 + 1600 s^2 + 3000 s}{4 s^3 + 18 s^2 + 118 s + 500}$$

```
Continuous-time transfer function.
```

4. Find the response of the system to a unit step input.

Command Window

```
>> step(transfer_function)
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```
>> stepinfo(transfer_function)
```

```
ans =
```

```
    RiseTime: 0.1457
```

```
SettlingTime: 48.7274
```

```
SettlingMin: -57.1203
```

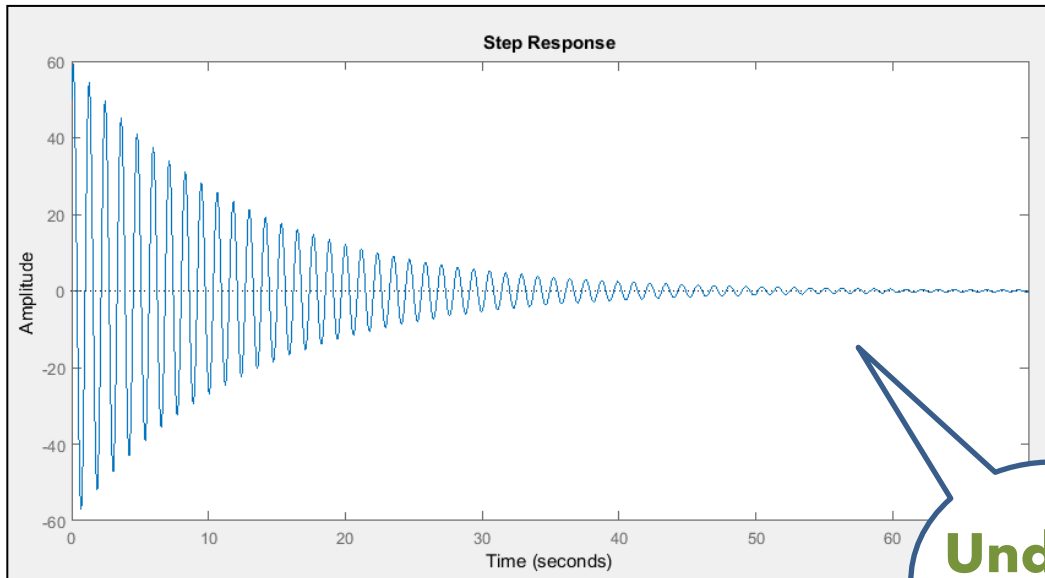
```
SettlingMax: 54.4565
```

```
    Overshoot: Inf
```

```
Undershoot: Inf
```

```
    Peak: 59.2499
```

```
    PeakTime: 0.1171
```



**Under
damping**

5. Find the impulse response of the system.
(impulse input signal)

Command Window

```
>> impulse(transfer_function)
```

