Control Systems

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***Abstract*—This manual is an introduction to control systems based on GATE problems.Links to sample Python codes are available in the text.**

Download python codes using

```
svn co https://github.com/gadepall/school/trunk/
    control/codes
```

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A lead Compensator network includes a parallel combination of R and C in feed-forward path. If the transfer function of compensator is

$$G_c(s) = \frac{s+2}{s+4} \tag{7.0.1}$$

, the value of RC is ?
And also find the value of RC for a lead compensator used in previuos example.

$$G_c(s) = \frac{3(s+\frac{1}{3})}{s+1} \tag{7.0.2}$$

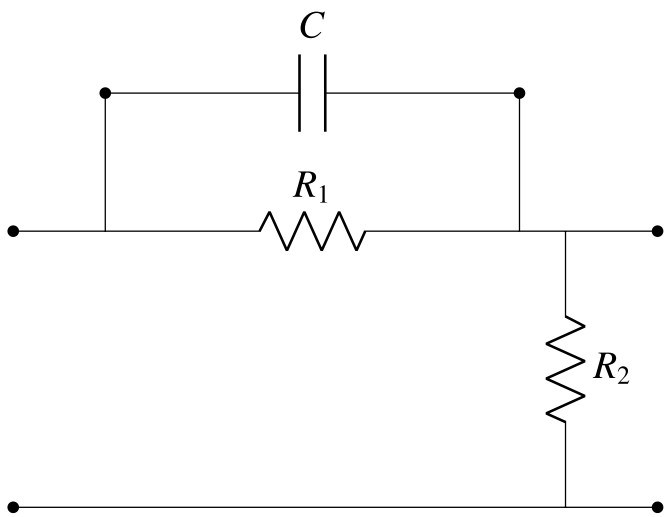

Fig. 7.0

Solution:
The transfer function for the following circuit is

$$T(s) = \frac{V_o}{V_i} \tag{7.0.3}$$

Let

$$\alpha = \frac{R_2}{R_1 + R_2} \tag{7.0.4}$$

$$\tau = R_1 C \tag{7.0.5}$$

Now our T(s) is

$$T(s) = \frac{R_2}{\frac{\frac{1}{sC}R1}{\frac{1}{sC}+R1} + R2} \tag{7.0.6}$$

Simplifying T(s)

$$T(s) = \frac{s+\frac{1}{\tau}}{s+\frac{1}{\tau\alpha}} \tag{7.0.7}$$

Comparing with the given

$$G_c(s) = \frac{s+2}{s+4}$$

$$\tau = R_1 C = 0.5 \tag{7.0.8}$$

for

$$T(s) = \frac{3(s + \frac{1}{3})}{s + 1} \tag{7.0.9}$$

here this is a lead compensator with a gain of 3. so we can simply write passive circuit part as.

$$T(s) = \frac{(s + \frac{1}{3})}{s + 1} \tag{7.0.10}$$

again by comparing with

$$T(s) = \frac{s + \frac{1}{\tau}}{s + \frac{1}{\tau\alpha}} \tag{7.0.11}$$

$$\tau = 3RC = 3 \tag{7.0.12}$$

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