

1092-4 Feedback Control System

總分 10/100 ?

Rules:

(a) This is an open-book exam. You have to 1) type the parameters for the controllers that meet the desired specs (pay attention to the format; no points will be given if the format is incorrect); and 2) upload your Matlab codes to iLMS for those problems marked with (M).

(b) You would fail this exam if plagiarism is detected in any form, e.g., sending answers to your classmates using Line; requesting an answer at a forum.

電子郵件 *

tuj0419@gapp.nthu.edu.tw

0 分, 共 0 分

Student ID *

107060011

Name *

涂皓鈞

1092-4 Feedback Control System

10 分, 共 100 分

Rules:

(a) This is an open-book exam. You have to 1) type the parameters for the controllers that meet the desired specs (pay attention to the format; no points will be given if the format is incorrect); and 2) upload your Matlab codes to iLMS for those problems marked with (M).

(b) You would fail this exam if plagiarism is detected in any form, e.g., sending answers to your classmates using Line; requesting an answer at a forum.



✗ (M) Consider a unity negative feedback system with process $G(s)$ and controller $G_c(s)$. Find K , z , and p to meet the specs. If $K=0.3$, $z=0.006$, and $p=2.3$, type [0.3 0.006 2.3]. .../15

$$G(s) = \frac{130}{s^2 + 7s}$$

$$G_c(s) = K \frac{s + z}{s + p}$$

Specs:

1) velocity constant $K_v=30$;

2) $54^\circ \leq P.M. \leq 56^\circ$;

3) zero steady-state error for step input;

[0.2590 0.414 0.0664]

✗

✓ Consider a unity negative feedback system with a stable process $G(s)$ and controller $G_c(s)=K$. The Bode plot of G can be found at <https://www.ee.nthu.edu.tw/wychiu/6.png> Find the value of K such that the resulting P.M. is approximately 45 degrees. 10/10

- ☐ $K= 5.04$
- ☐ $K=25.7$
- ☒ $K=10.23$
- ☐ $K=20.4$
- ☐ $K=15$

✓



✗ (M) Consider a unity negative feedback system with process $G(s)$ and controller $G_c(s)$. Find K , z , and p to meet the specs. If $K=0.3$, $z=0.006$, and $p=2.3$, type [0.3 0.006 2.3]. .../15

$$G(s) = \frac{1}{(s+2)(s+5)(s+8)}$$

$$G_c(s) = K \frac{s+z}{s+p}$$

Specs:

- 1) 5% steady-state error for step input;
- 2) P.O. $\leq 5\%$;

[6.65 8 0.035]

✗



✗ (M) Consider a unity negative feedback system with process $G(s)$ and controller $G_c(s)$. Find K , z , and p to meet the specs. If $K=0.3$, $z=0.006$, and $p=2.3$, type [0.3 0.006 2.3]. .../20

$$G(s) = \frac{520}{s^3 + 7s^2 + 8s}$$

$$G_c(s) = K \frac{s + z}{s + p}$$

Specs:

1) velocity constant $K_v=50$;

2) $60^\circ \leq P.M. \leq 62^\circ$;

3) zero steady-state error for step input;

[0.0075 0.0468 0.00045735]

✗



✗ (M) Consider a unity negative feedback system with process $G(s)$ and controller $G_c(s)$. Find K , z , and p to meet the specs. If $K=0.3$, $z=0.006$, and $p=2.3$, type [0.3 0.006 2.3]. .../15

$$G(s) = \frac{s + 4}{(s + 0.17)(0.14s + 1)(s + 13)}$$

$$G_c(s) = K \frac{s + z}{s + p}$$

Specs:

1) steady-state error to step input=0;

2) $37^\circ \leq P.M. \leq 39^\circ$;

3) settling time ≤ 1.1 s

[61.3208 2.12 0]

✗



✗ Consider a unity negative feedback system with a stable process $G(s)$ and controller $G_c(s)$. The root locus of $L=G*G_c$ can be found at <https://www.ee.nthu.edu.tw/wychiu/7.png> Select the 3 poles of the closed-loop system. 0/10

☒ -7.1

✗

☐ -0.17

☐ -5.1

☒ -1.9+6.6i; -1.9-6.6i

✗

☐ -9.76

☐ -7.6

☐ -1.74+5.18i; -1.74-5.18i

☐ -2.8+15i; -2.8-15i

正確答案

☒ -7.6

☒ -1.74+5.18i; -1.74-5.18i

✗ (M) Consider a unity negative feedback system with process $G(s)$ and controller $G_c(s)$. Find K , z , and p to meet the specs. If $K=0.3$, $z=0.006$, and $p=2.3$, type [0.3 0.006 2.3]. .../15

$$G(s) = \frac{3.8}{(s + 0.17)(0.14s + 1)}$$

$$G_c(s) = K \frac{s + z}{s + p}$$

Specs: settling time ≤ 2 s; $9\% \leq \text{P.O.} \leq 10\%$

[1.31 0 0]

✗



這份表單是在 清華大學 中建立。