106 EE 04

國立臺北科技大學 106 學年度碩士班招生考試

系所組別：2132 電機工程系碩士班丙組

第一節　控制系統　試題　（選考）

注意事項：

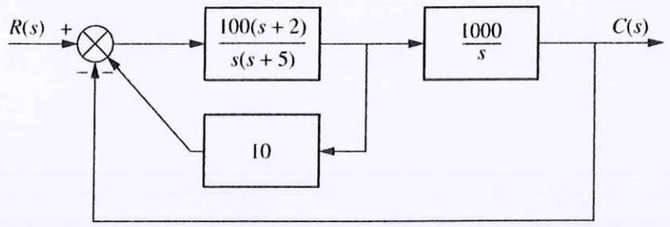
1. 本試題共 4 題，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Given the unity feedback system with the plant $G(s)=\dfrac{K}{s(s+a)}$.

10% (a) Find K and a to yield the velocity constant $K_v=500$ and a 20% overshoot.

10% (b) Find the sensitivity of the steady-state error to changes in parameter K with unit step input.

2. Considering the following system.



15% (a) Find the static error constants K_p, K_v, and K_a.

15% (b) Find the steady-state error for an input of $50u(t)$, $50tu(t)$, and $50t^2u(t)$.

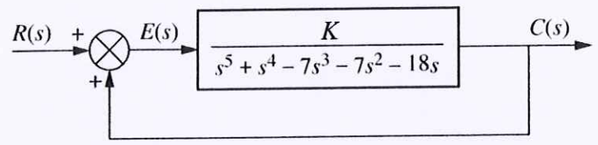
10% (c) State the system type. Justify your answer.

3. Given the unity feedback system with the plant $G(s)=\dfrac{K(s+2)}{s(s+10)(s^2+2s+2)}$.

10% (a) Sketch the root locus.

10% (b) Find the range of gain K for stability of the closed-loop system.

4. Considering the following system.



10% (a) If $K=18$, determine how many poles of the closed-loop are located in the right half-plane, in the left half-plane, and on the $j\omega$-axis.

10% (b) Find the range of K for stability.