

# 國立臺北科技大學 110 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

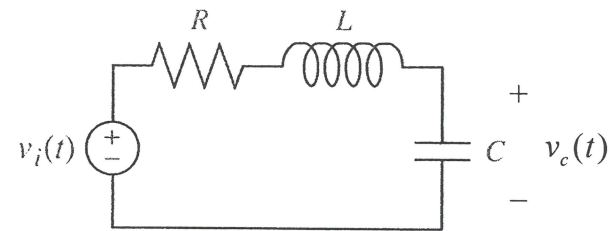
## 第一節 控制系統 試題 (選考)

第 1 頁 共 1 頁

### 注意事項：

1. 本試題共四題，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

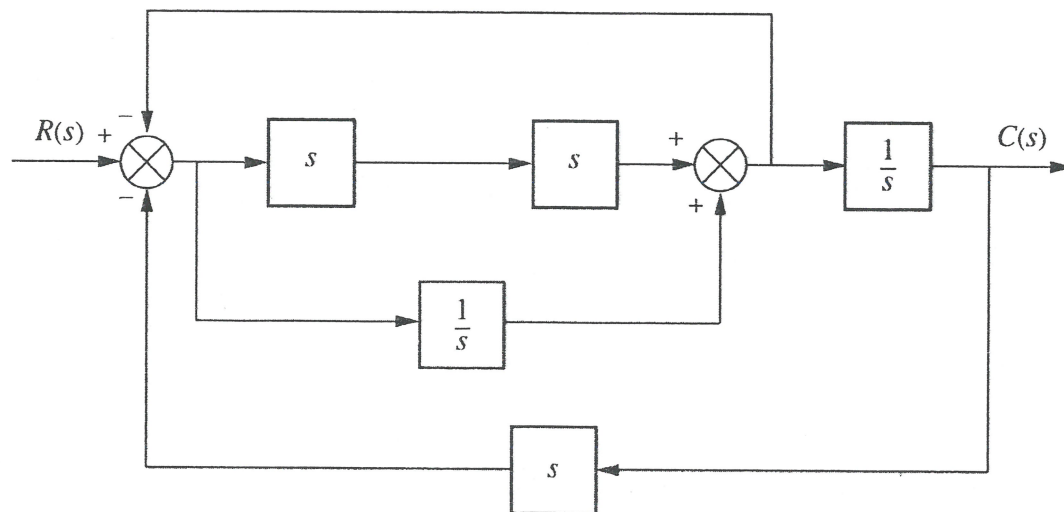
1. Consider the following RLC circuit:



5% (a) Find the transfer function  $V_c(s)/V_i(s)$ .

10% (b) If  $v_i(t)$  is a unit step input and  $C=10\mu\text{F}$ , find  $R$  and  $L$  to yield 15% overshoot with a settling time of 7 ms for the capacitor voltage  $v_c(t)$ .

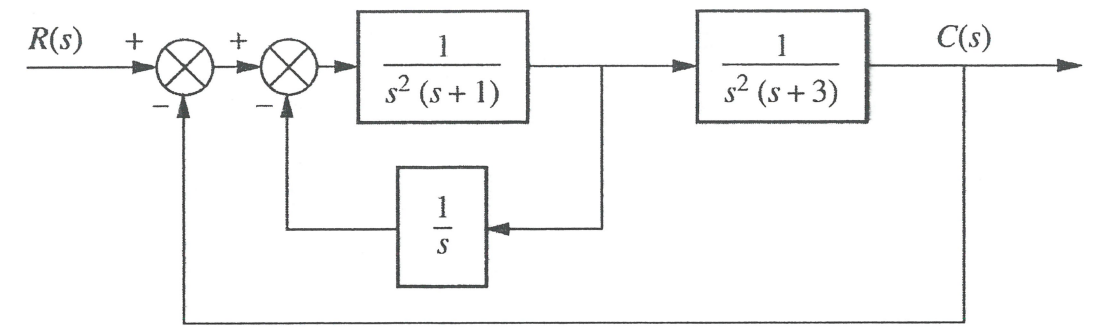
2. Consider the following system:



10% (a) Find the equivalent transfer function  $C(s)/R(s)$ .

10% (b) Determine whether the whole system is stable. Justify your answer.

3. Consider the following system:



10% (a) Find the equivalent transfer function  $C(s)/R(s)$ .

10% (b) Determine whether the whole system is stable. Justify your answer.

10% (c) Find the steady-state error for an input  $r(t) = 5u(t)$ .

4. Given the unity feedback system with the plant  $\frac{K(s+2)(s+1)}{(s-2)(s-1)}$ .

10% (a) Sketch the root locus.

10% (b) Find the breakaway and break-in points.

10% (c) Find the range of gain  $K$  that makes the system stable.

5% (d) Find the value of gain  $K$  that yields a stable system with critically damped response.