

淡江大學 97 學年度碩士班招生考試試題

系別：電機工程學系控制晶片與系統組
電機工程學系機器人工程碩士班

科目：控 制 系 統

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准帶項目請打「V」	
✓	簡單型計算機

本試題共 / 頁， 4 大題

1. A system is represented by the state and output equations:

$$\dot{x}(t) = \begin{bmatrix} 0 & 1 \\ -2 & -2 \end{bmatrix} x(t) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(t).$$

$$y(t) = [2 \quad 3]x(t)$$

Find

- the characteristic equation; (10%)
- the poles of the system; (10%)
- the unit step response of system. (10%)

2. Find the following for the system in Fig. 1:

- The equivalent single block that represents the transfer function, $T(s) = \frac{C(s)}{R(s)} = ?$ (10%)
- The damping ratio, natural frequency, percentage overshoot, settling time, peak time, rise time, and damped frequency of oscillation for a step input. (10%)

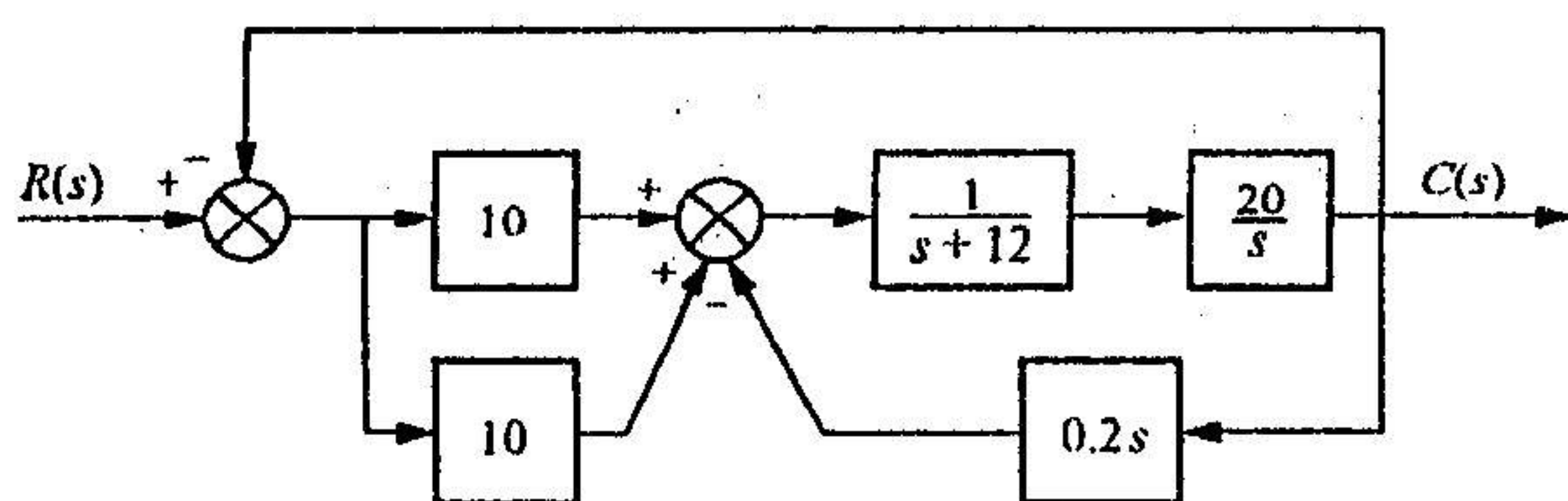


Fig. 1

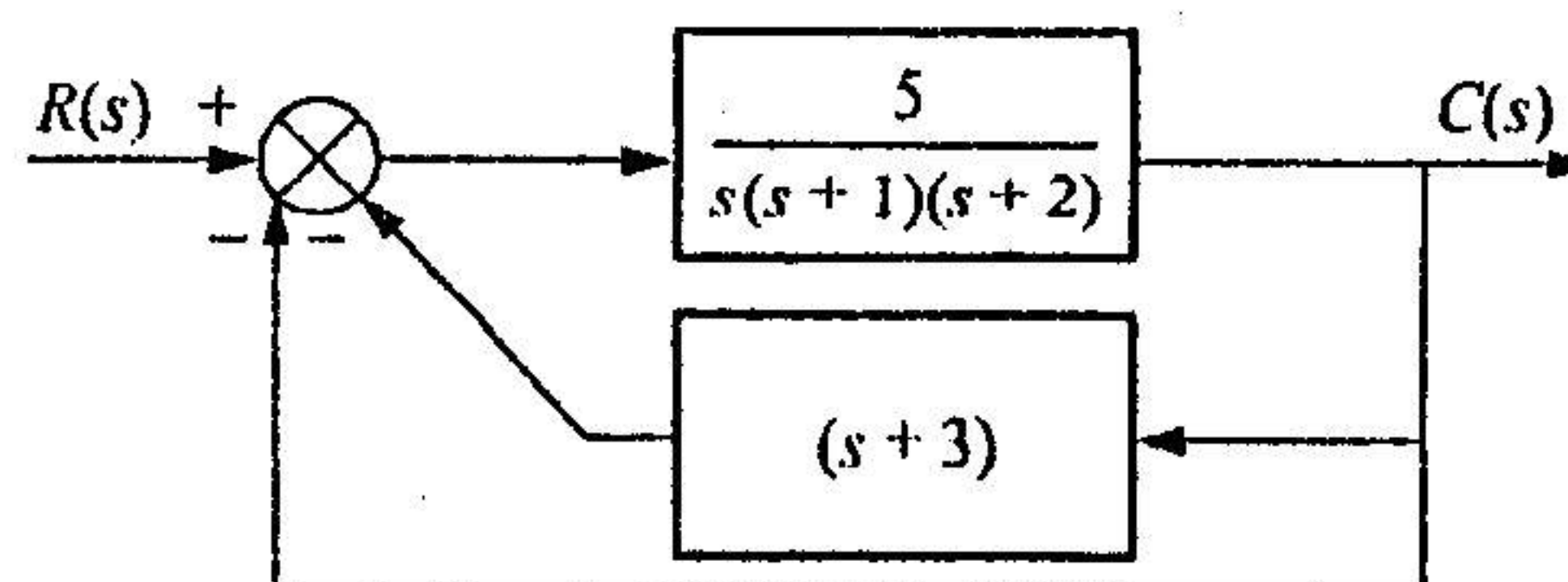


Fig. 2

3. For the system shown in Fig. 2

- Find K_p, K_v, K_a . (10%)
- Find the steady-state error for an input of $50u(t)$, $50tu(t)$, and $50t^2u(t)$, respectively. (10%)

4. For the unity feedback system of Fig. 3 with

$$G(s) = \frac{K(s+4)}{s(s+1)(s+2)}$$

Find the following:

- The range of K that keeps the system stable. (10%)
- The value of K that makes the system oscillate. (10%)
- The frequency of oscillation when K is set to the value that makes the system oscillate. (10%)

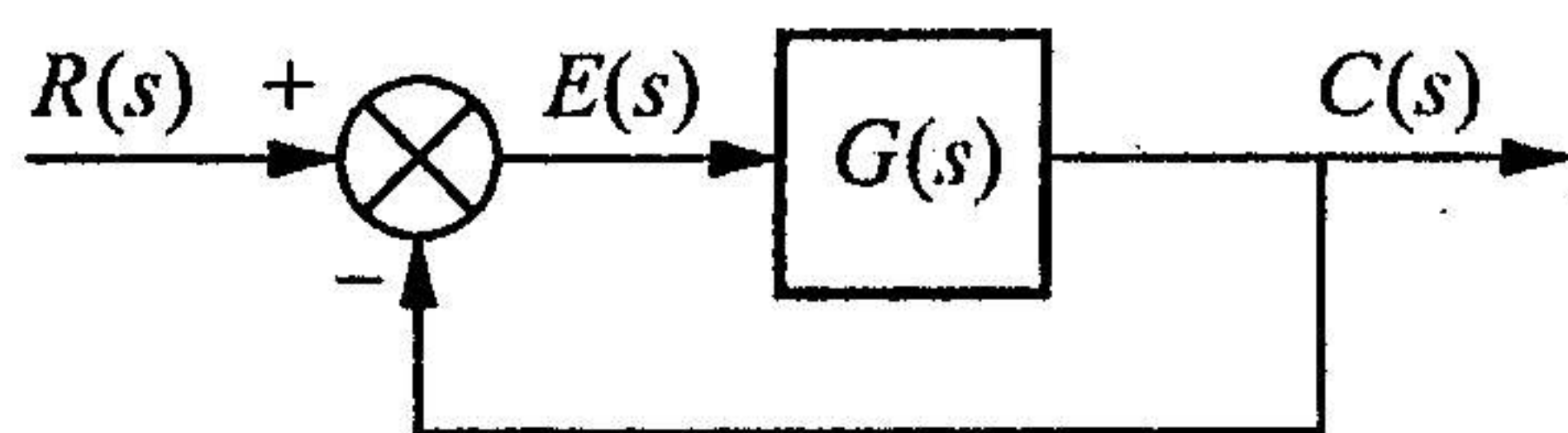


Fig. 3