

國立臺北科技大學 107 學年度碩士班招生考試

系所組別：1502 自動化科技研究所

第二節 自動控制 試題 (選考)

第一頁 共一頁

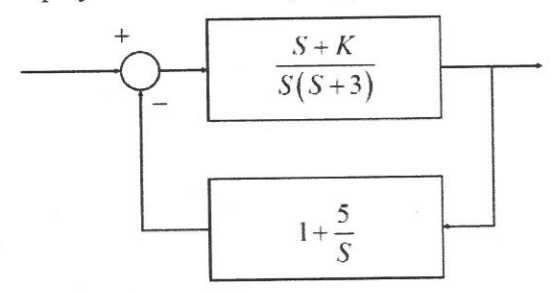
注意事項：

1. 本試題共 5 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. True-False Questions.

- A. () For the closed-loop linear system, the eigenvalues are the poles. (5%)
- B. () Bounded-Input Bounded-Output (BIBO) stable implies asymptotically stable. (5%)
- C. () Asymptotically stable implies Bounded-Input Bounded-Output (BIBO) stable. (5%)
- D. () Linear system is causal system. (5%)

2. Please draw the complete root loci of the following system for $K \geq 0$ and find the range of K for which the closed-loop system is stable. (20%)



3. Please draw the Bode plot of $G(S)$, where $G(S) = \frac{10(S+10)}{S(S+2)(S+5)}$. (20%)

4. Please find the state feedback gains such that the eigenvalues of the closed-loop system can be assigned to $-3 \pm j$ and -4 (20%)

$$\dot{x} = \begin{bmatrix} 0 & 1 & -2 \\ 1 & 5 & 2 \\ 0 & 1 & -1 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u.$$

5. Please find the linearization system for the following nonlinear system with the operating point (1,1) and find the range of K such that the linearization system is stable. (20%)

$$\begin{aligned} \dot{x}_1 &= -5x_1^2 + Kx_2^2 + u \\ \dot{x}_2 &= -2x_1x_2 + u \end{aligned}$$