國 立 臺 北 科 技 大 學

九十七學年第二學期電機系博士班資格考試

控制系統(大學部)試題(公告用)

注意事項：

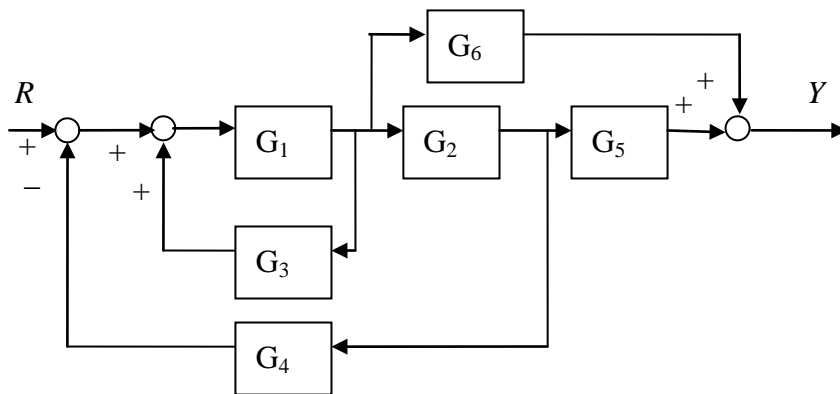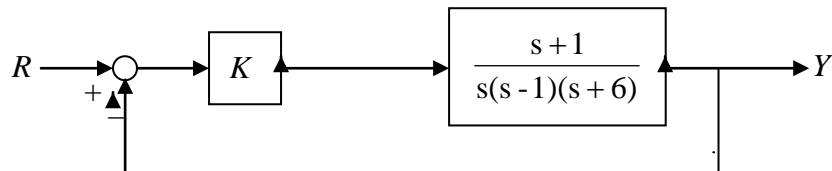1. 本試題共【4】題，配分共 100 分。
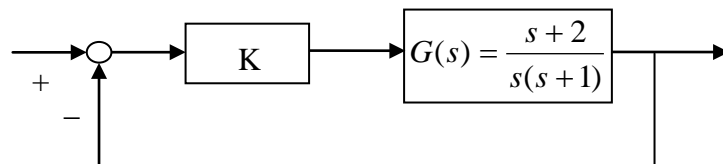2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間:二小時，不可使用計算器。

1. (25%) Determine the transfer function (from R to Y) of the following system.

2. (25%) Apply Routh's stability criterion to determine the range of K such that the closed-loop system is stable.

$$R \longrightarrow \bigcirc \longrightarrow \boxed{K} \longrightarrow \boxed{\dfrac{s+1}{s(s-1)(s+6)}} \longrightarrow Y$$

3. (25%) Draw the root locus of the following system and determine the departure/arrival angles and/or break-in/break-away points if applicable.

$$\longrightarrow \bigcirc \longrightarrow \boxed{K} \longrightarrow \boxed{G(s) = \dfrac{s+2}{s(s+1)}} \longrightarrow$$

4. (25%) Draw the Nyquist plot of the following system and determine the range of K for which the closed system is stable by using Nyquist stability criterion.

$$\longrightarrow \bigcirc \longrightarrow \boxed{K} \longrightarrow \boxed{G(s) = \dfrac{1}{s(s+1)}} \longrightarrow$$