

國立臺北科技大學 112 學年度碩士班招生考試

系所組別：1501 自動化科技研究所

第二節 自動控制 試題 (選考)

第 1 頁 共 1 頁

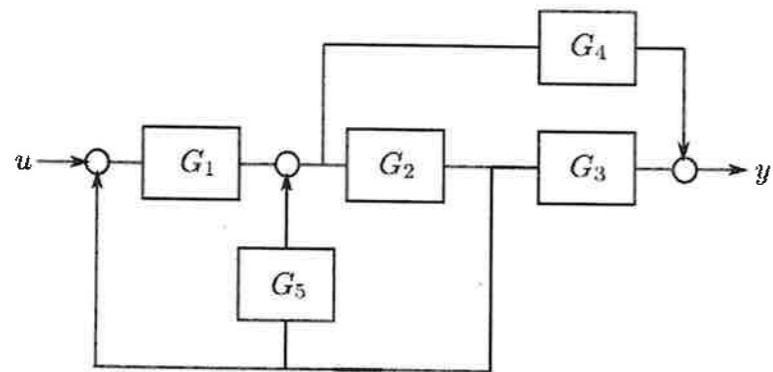
注意事項：

1. 本試題共五題，每題二十分，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欄內依照順序作答，並詳列過程否則不予計分。

1. (20%) Suppose the transfer function of the following block diagram from u to y in terms of G_1, G_2, \dots, G_5 can be written as follows

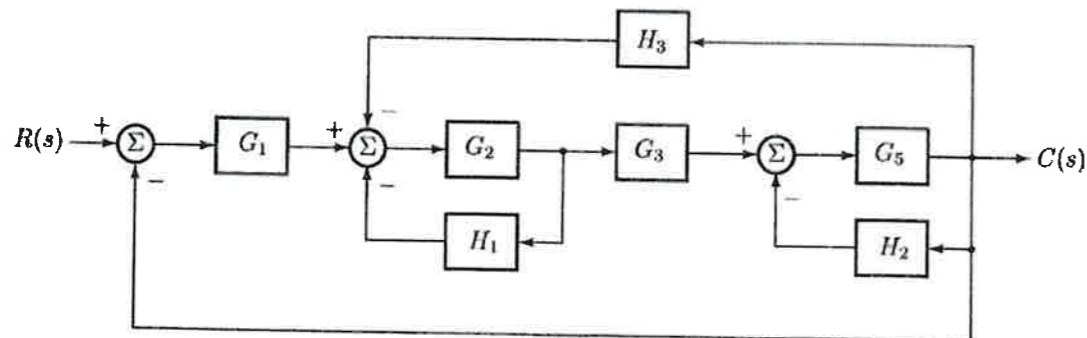
$$\frac{y}{u} = \frac{G_3 G_2 G_1 + G_4 G_1}{1 - G_2 G_5 + A}$$

Find $A = ?$

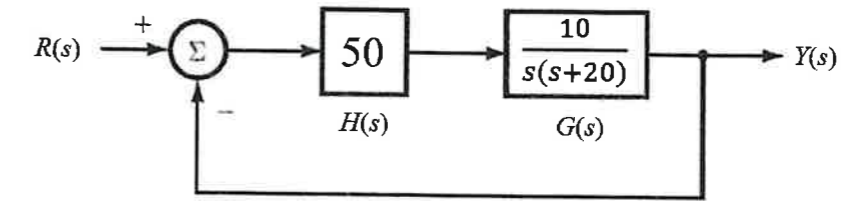


2. (20%) For the following control system,

- (a) draw the corresponding signal flow graph (10%)
- (b) determine the transfer function $C(s)/R(s)$ (10%)



3. (20%) Find the unit-impulse response of the following system.



4. (20%) Find the poles and zeros of the following functions (including the ones at infinity, if any).

- (a) (10%)

$$G(s) = \frac{10(s+2)}{s^2(s+1)(s+10)}$$

- (b) (10%)

$$G(s) = \frac{10s(s+1)}{(s+2)(s^2+3s+2)}$$

5. (20%) Determine if the following systems are asymptotically stable, marginally stable, or unstable. You have to explain the reason for your answer to get the points.

- (a) (10%)

$$M(s) = \frac{10(s+2)}{s^3 + 3s^2 + 5s}$$

- (b) (10%)

$$M(s) = \frac{100}{s^3 - 2s^2 + 3s + 10}$$