

# 國立臺北科技大學

101 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

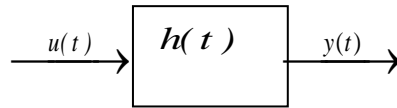
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### 注意事項：

1. 本試題共 5 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。
5. 可用計算機。

1. (20%) Consider the following system with impulse response  $h(t)$ .

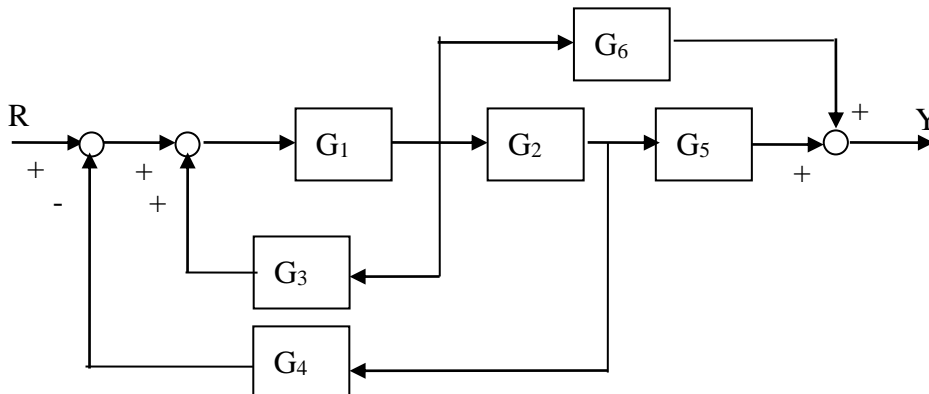


How does  $y(t)$  relate to  $u(t)$ ?

Let  $L$  denote the Laplace transform and  $L\{f(t)\} = F(s)$ . Show that  $Y(s) = H(s) \cdot U(s)$ .

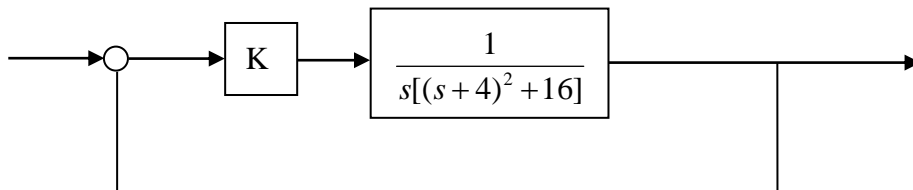
2. (20%) Consider the following system block diagram and determine the transfer function

$$\frac{Y}{R}.$$



3. (20%) Given the characteristic polynomial of a system as  $s^3 + 7s^2 + 25s + 39$ . Determine whether its roots are in the open left hand side of  $s = -1$ ?

4. (20%) Draw the root locus of the following system including the departure angles and imaginary axis crossing points.



5. (20%) Draw the Nyquist plot of the following system and determine the range of  $K$  such that the system is stable.

