

國立臺北科技大學 107 學年度碩士班招生考試

系所組別：1302 車輛工程系碩士班

第二節 自動控制 試題 (選考)

第一頁 共一頁

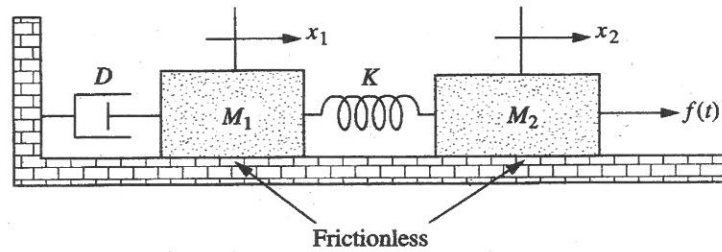
注意事項：

1. 本試題共 5 題，每題 20 分，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. For the following mechanical system,

A. Find the transfer function $G(s) = \frac{X_1(s)}{F(s)}$. (10%)

B. Find the state equations representation of the system. (10%)

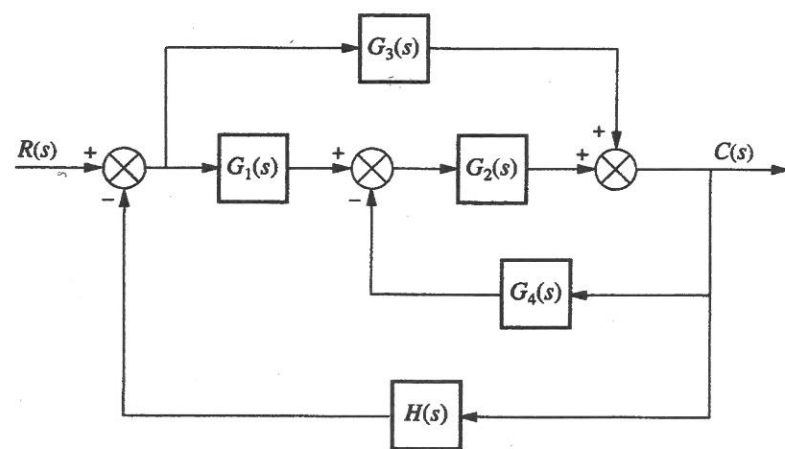


2. Reduce the following system to a single transfer function $G(s) = \frac{C(s)}{R(s)}$.

A. By the block diagram reduction method. (10%)

B. Convert the system into the form of signal flow graph. (5%)

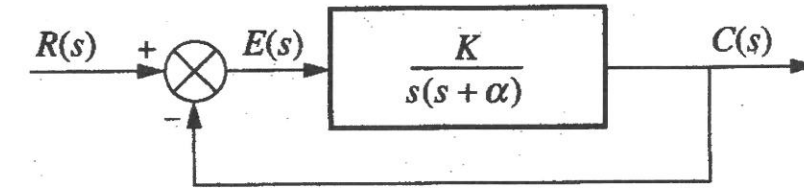
C. Find the transfer function by Mason's gain formula. (5%)



3. For the following system

A. Find K and α to yield a settling time of 0.2 second and a 30% overshoot. (10%)

B. Find the time response $c(t)$ when the input $R(s) = \frac{1}{s}$. (10%)

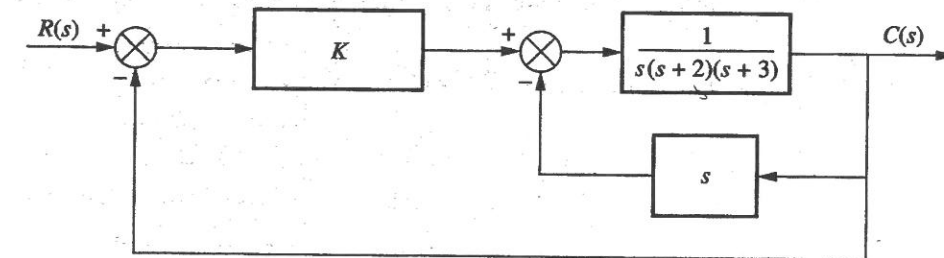


4. For the following system,

A. Find the range of gain, K , that will make the system stable. (10%)

B. Find the value of K that will make the system oscillate. Also, find the frequency of oscillation. (5%)

C. What is the system type of this system? Find the corresponding error constant for the system. (5%)



5. If the Bode plot of $G(s) = \frac{K}{s(\tau s + 1)}$ is plotted as following,

A. Find the value of K and τ from the plot. (15%)

B. What is the bandwidth of this system. (5%)

