

明新科技大學

九十六學年度研究所 碩士班 招生考試試題卷
 碩士在職專班

系所名稱	科目	准考證號碼 (請考生填入)	考試日期	節次	第 1 頁 / 共 2 頁
精密機電工程研究所	自動控制		96年5月6日	第二節	

答案須寫在答案卷內，否則不予計分。

1. For the system shown in Figure 1, write the equations of motion for the system and find the transfer function $Y_1(s)/F(s)$. (15%)

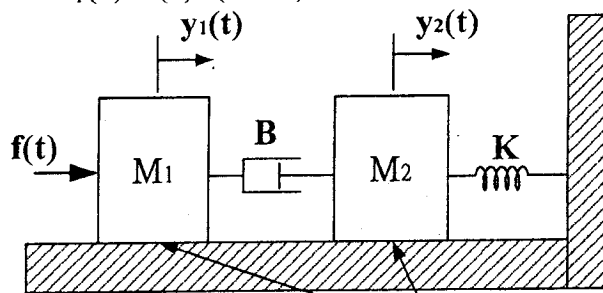


Figure 1

2. (1) Solve the following differential equation by using the Laplace transform. (10%)
 $\ddot{y}(t) + 5\dot{y}(t) + 6y(t) = 10u(t), y(0) = 0, \dot{y}(0) = 0$
- (2) Assume that $y(t)$ is the displacement of a mechanical system. What is the displacement of the system, when $t \rightarrow \infty$? (5%)
3. Given a system with transfer function $G(s) = \frac{360}{s^2 + 16s + 360}$,
- (1) Find the damping ratio (ξ) and natural frequency (ω_n) (10%)
 (2) Find the peak time (T_p) and settling time (T_s) for a unit step input of $u(t)$. (10%)
4. For the system of Figure 2, (1) Find the transfer function. (6%), (2) Use the Routh-Hurwitz criterion to determine the range of gain, K , that will cause the system to be stable. (9%)

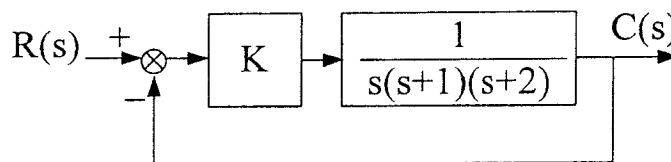


Figure 2

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精密機電工程研究所	自動控制		96年5月6日	第二節	

答案須寫在答案卷內，否則不予計分。

5. For the system shown in Figure 3,
- (1) Evaluate system type, the position constant (K_p), velocity constant (K_v), and acceleration constant (K_a). (12%)
 - (2) Find the steady-state errors for inputs of $5tu(t)$ and $5t^2u(t)$. The function $u(t)$ is the unit step. (8%)

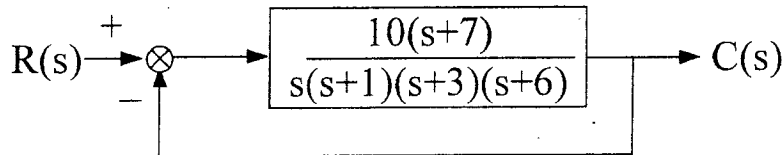


Figure 3

6. Given the closed-loop system of Figure 4 with the forward-path transfer function $G(s) = \frac{20}{s(s+10)}$. Draw the Bode log-magnitude and phase plots for the system. (15%)

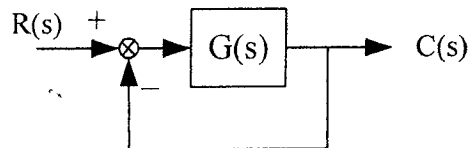


Figure 4