國立中央大學97學年度碩士班考試入學試題卷

所別：電機工程學系碩士班 系統與生醫組　　　　科目：控制系統　　共 1 頁 第 1 頁

*請在試卷答案卷（卡）內作答

參考用

1. Which of the following systems is stable .(20%)
   (1) $s^4-6s^3-s^2-17s-6=0$
   (2) $s^3-4s^2+6s+100=0$
   (3) $s^4+s^3+2s^2+10s+8=0$
   (4) $s^5+s^4+2s^3+s+5=0$
   (5) $s^5+s^4+2s^3+s^2+s+k=0$
   (6) $s^3+4s^2+6s+6=0$
2. Consider the feedback control system in the following Fig.1.

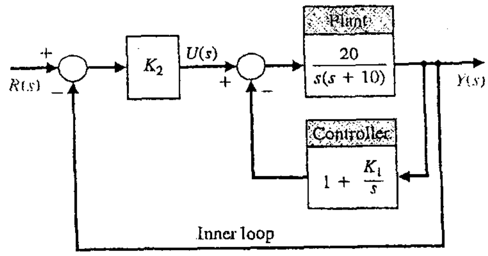

Fig.1

   (1) Find the range of K_1 leading to a stable inner loop ($\frac{Y(s)}{U(s)}$) (10%)
   (2) Find the range of K_2 such that the closed-loop system $T(s)=\frac{Y(s)}{R(s)}$ is stable (10%)

3. Given the functional block diagram Fig.2, find values of the parameters k and a so that the steady-state error to a unit step input is zero. (20%)

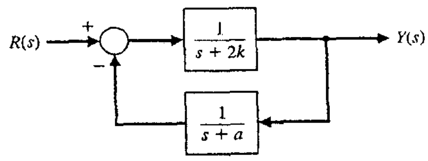

Fig.2

4. A two-mass system is shown in Fig.3, find the matrix differential equation when the output variable is $y_2(t)$. (20%)

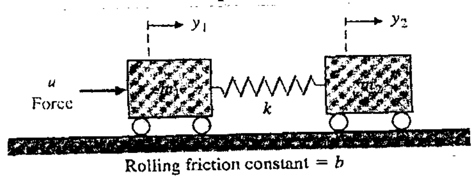

Fig.3

5. Obtain the closed-loop transfer function $T(s)=\frac{Y(s)}{R(s)}$ for the system of Fig.4. (20%)

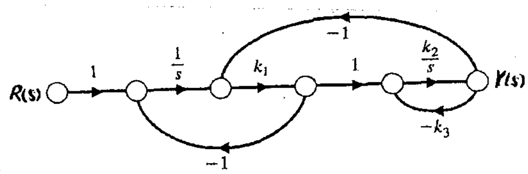

Fig.4