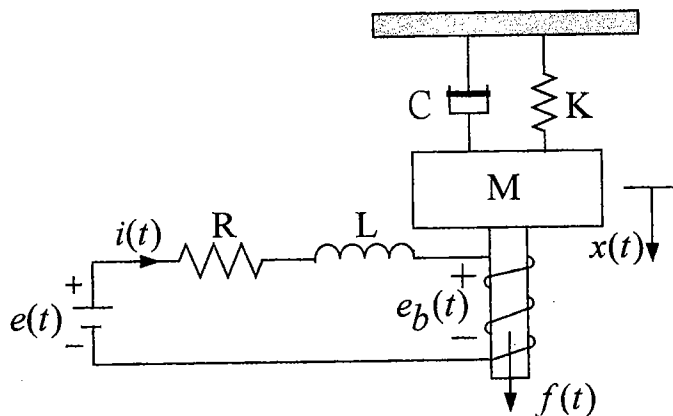


大葉大學 九十三年 學年度 研究所碩士班 招生考試試題紙

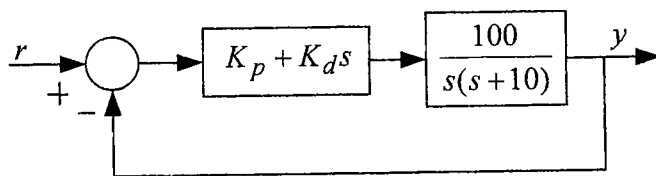
系所別	組別	考試科目 (中文名稱)	考試日期	節次	備註
機電自動化研究所	甲	自動控制	3月28日	第二節	可攜帶計算機 p2-1

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶） 10:30~12:00

- Consider the magnetic system shown below. The magnetic force on the mass M is $f(t) = K_i i(t)$, and the back E.M.F of the coil is $e_b(t) = K_b dx/dt$. (20%)
 - Write the equations of motion for this system. (5%)
 - Sketch the block diagram. (5%)
 - Find the transfer function $X(s)/E(s)$. (10%)



- Consider the feedback control system as shown below. (20%)
 - Find K_p , if the steady state error is 0.01 for a unit ramp input. (5%)
 - For this value of K_p , sketch the root locus of the closed system with $K_d > 0$. (10%)
 - Find K_d , if the system will have a critical damping ratio (K_p as (b)). (5%)



- A unity negative feedback control system is characterized by an open loop transfer function (20%)

$$G(s) = \frac{K_1 s + K_2}{s^2 + 2s + 10}$$

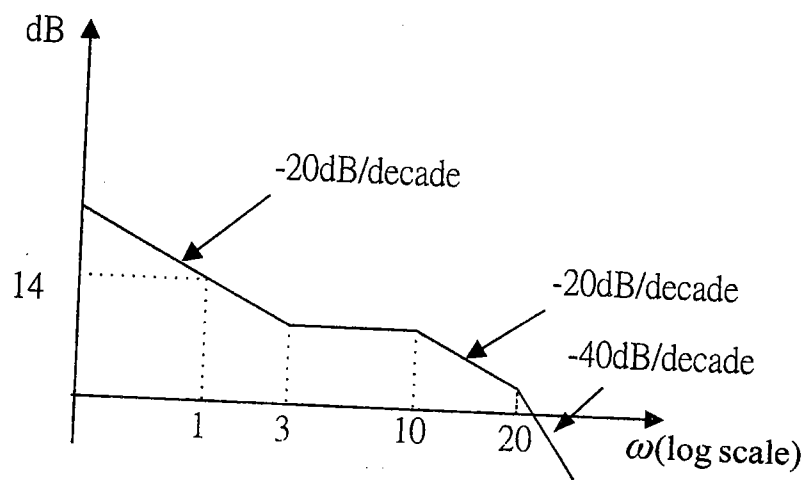
- Find the values of K_1 and K_2 so that the closed loop system has damping rate $\xi = 0.5$ and nature frequency $\omega_n = 10$ rad/sec. (10%)
- For those values of K_1 and K_2 , determine the output and the maximum overshoot for a unit step input. (10%)

大葉大學 九十三 學年度 研究所碩士班 招生考試試題紙

系 所 別	組 別	考 試 科 目 (中文名稱)	考 試 日 期	節 次	備 註
機電自動化研究所	甲	自動控制	3月28日	第二節	P. 2-2

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶） (0-30~12-00)

4. Consider a linear system with the bode plot of magnitude shown below. Assume it is minimum phase. (20%)
- Estimate the transfer function. (5%)
 - Sketch the bode plot of phase. (10%)
 - Is the unity feedback of control system stable? (5%)



5. A unity feedback control system has open loop transfer function as (20%)

$$\frac{K(s^2 + 8)}{s^3 + 4s^2 + 6s + 16}$$

- Determine the range K for stability. (10%)
- Determine the value of K which will cause sustained oscillation in the closed loop system and find the corresponding oscillation frequency. (10%)