國立臺北科技大學105學年度碩士班招生考試

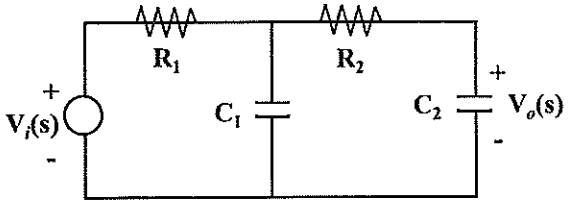
系所組別：1412 能源與冷凍空調工程系碩士班甲組

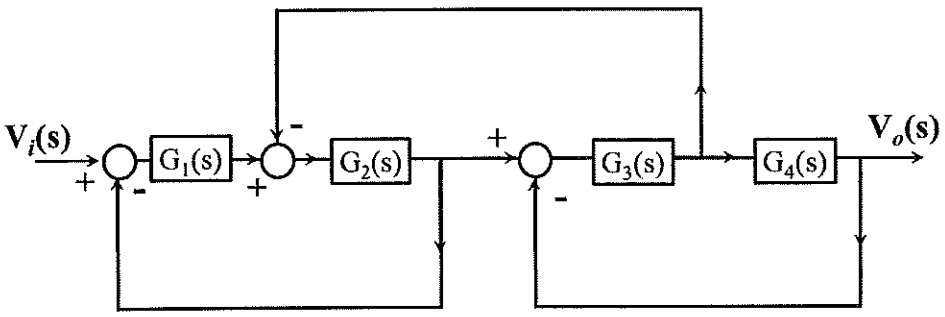
第三節　自動控制　試題　（選考）

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。

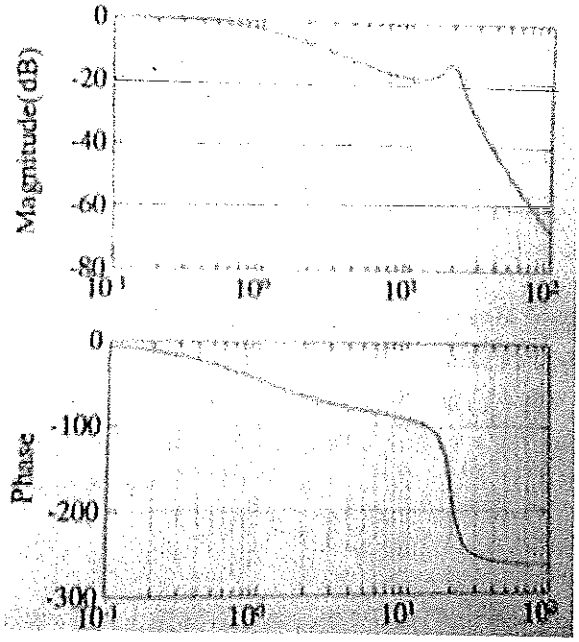
1. The block diagram of electrical circuit is shown below. Please find $G_1(s)$, $G_2(s)$, $G_3(s)$, $G_4(s)$. (20pts)





2. The characteristic equation of an air-conditioning system is $s^3+s+K(s^2+b)=0$, $0 \leqq K \leqq \infty$. Sketch the root locus for b = 1/3, (20pts)

3. Examine the following air-conditioning system and determine:
   (a)The steady state gain of the system. (10pts)
   (b)Assume the damping coefficient of the system is 0.1, please identify the approximate locations of the system poles. (10pts)



4. Sketch the Nyquist plot for a system with the open loop transfer function $G(s)H(s)=1/(s^5+s)$. Determine whether the closed loop system is stable. (10pts) If not, how many closed loop poles in the right half s-plane. (10pts)

5. With the following control system,
   (a)Determine the range of K such that the system is stable. (10pts)
   (b)Determine the range of K such that the steady-state value of e(t) will be less than 0.02 when the input $\theta_r(t) = 0.1$ for t>0. (10pts)