大葉大學 九十二 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
車輛工程研究所	甲組	車輛電子學或自動控制	4 月 13 日	第 3 節 13:30 ~ 15:00	考生可攜帶計算機

共3頁 P3-1

* 請考生特別注意：請由以下題目中任選五題作答(答題數目不可超過五題、否則不予計分)，每題 20 分.

1. The Wheatstone bridge is shown as Figure (1), where R_1, R_2, and R_3 are known while R_x is an unknown resistance, to be determined.
   (1) Please find the value of the voltage $v_{ab} = v_{ad} - v_{bd}$ in terms of the four resistances and the source voltage, v_s. Note that since the reference point d is the same for both voltages, we can also write $v_{ab} = v_a - v_b$.
   (2) If $R_1 = R_2 = R_3 = 1K\Omega$, $v_s = 12V$, and $v_{ab} = 12\,mV$, what is the value of R_x?

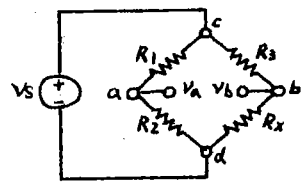


Figure (1)

2. Please find the Norton equivalent circuit to the left of terminals a and b for the network of Figure (2).

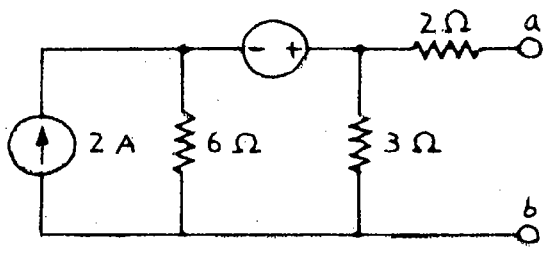


Figure (2)

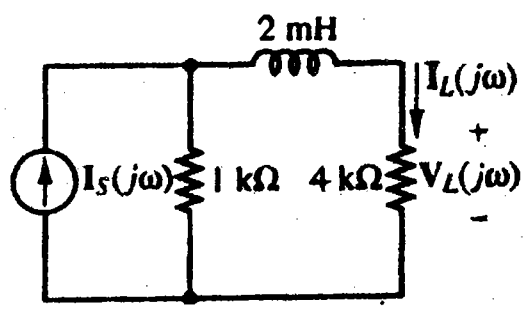


Figure (3)

3. Please compute the frequency response $H_z(j\omega)$ for the circuit of Figure (3).

4. A common-emitter amplifier is shown in Figure (4). The transistor has the following h parameters: $h_{ie} = 1,400\Omega$, $h_{fe} = 100$, and $h_{oe} = 125\ \mu S$. Resistors R_1 and R_2 determine the DC operating point. The source has an internal resistance of 500 Ω. Please find the actual voltage and current gain of this amplifier.

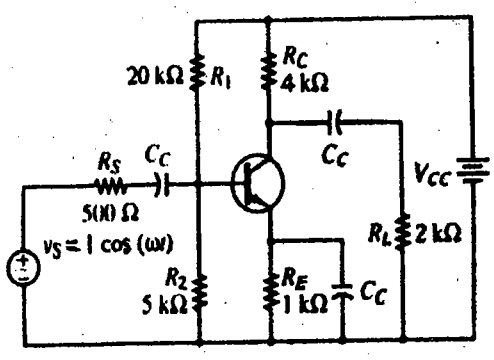


Figure (4)

5. Please design the logic circuit that implements the truth table shown as Figure (5) (use only two-input gates)
   (1) Please show the Karnaugh map?
   (2) Please show the logic circuit?

A	B	C	D	y
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

Figure (5)

6. Given the root locus shown in Figure (7).

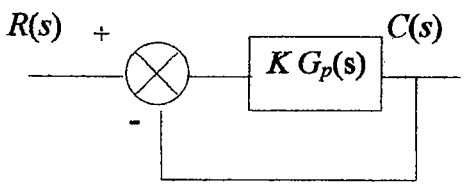


Figure (6)

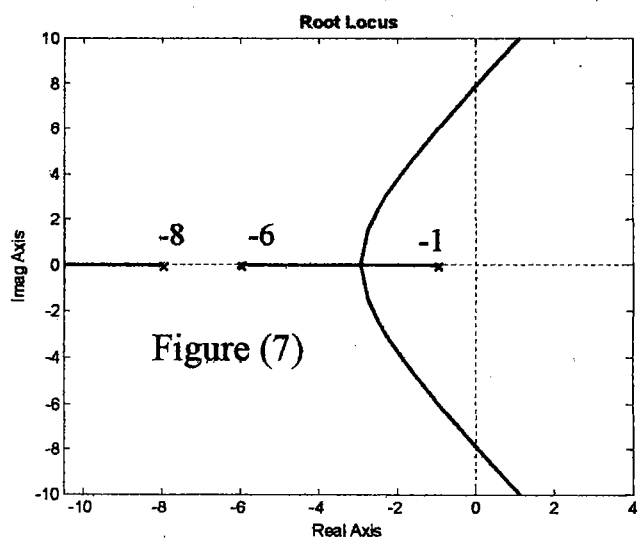


Figure (7)

a. Find the open-loop system $G_p(s)$, if the system is shown as in Figure (6). (5%)
b. Find the break-away point, and the corresponding gain K. (10%)
c. Find the three asymptotes: angles and intersection in the real axis. (5%)

7. As in problem 6,

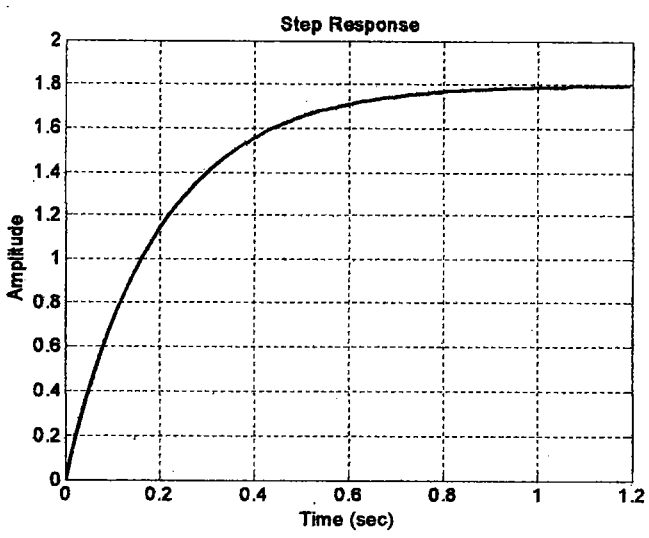
a. Find the value of gain that will make the system marginally stable and also the $j\omega$-crossing points. (10%)

b. Find the value of gain that will make the system step response with %OS=15%. (10%)

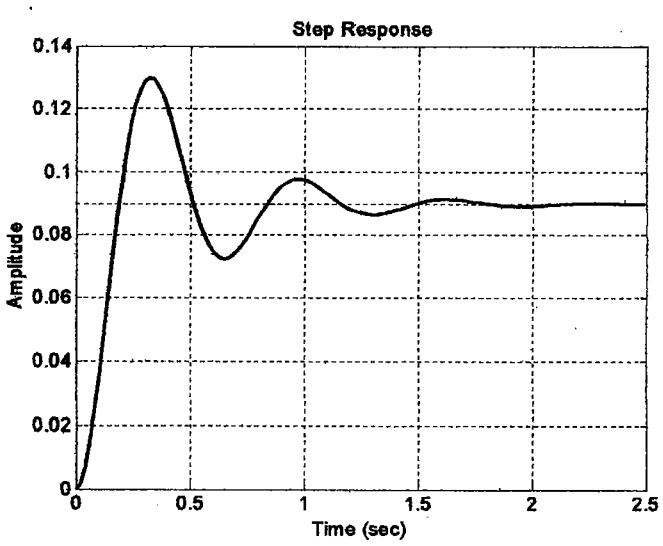
8. For each of the **unit step response** shown below, find the parameters in the transfer function of the system

(a) $G(s)=\dfrac{k}{s+a}$ (5%)

(b) $G(s)=\dfrac{k}{s^2+2\zeta\omega_n s+\omega_n^{\,2}}$ (15%)

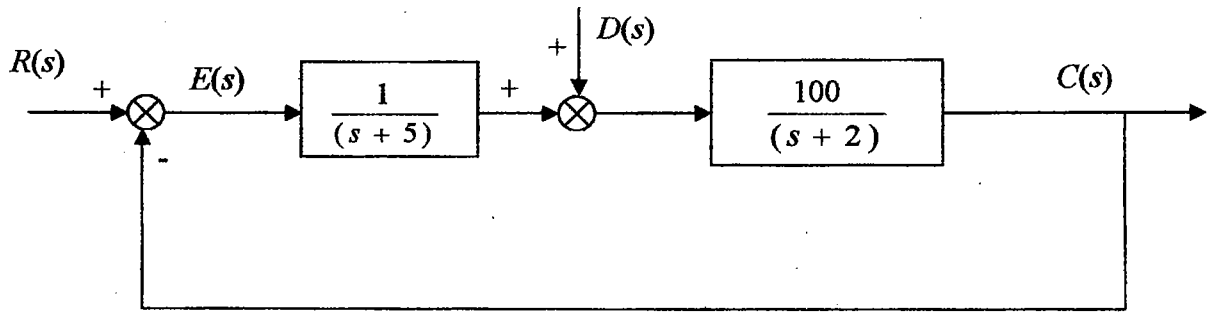


System (a)



System (b)

9. For the system below



(a) Derive the output $C(s)$ in terms of $R(s)$ and $D(s)$. (10%)

(b) When $R(s)$ and $D(s)$ are unit-step functions, what is the total steady-state error. (10%)

10. (a)There are three second order systems and their pole locations are shown as below (right figure).

Find out the corresponding time response in the left figure. Explain why!! (10%)

(b)What specifications in the transient response are the same for these three systems? (10%)