

# 國立臺北科技大學九十八學年度碩士班招生考試

系所組別：1512 自動化科技研究所甲組

## 第二節 自動控制 (選考) 試題

第一頁 共二頁

### 注意事項：

1. 本試題共 5 題，配分共 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。

一、 Please complete the block diagram of Fig. b by filling in the block (1)~(4) in the block diagram from the names of the devices shown in Fig. a. (3% for each block and 12 % in total)

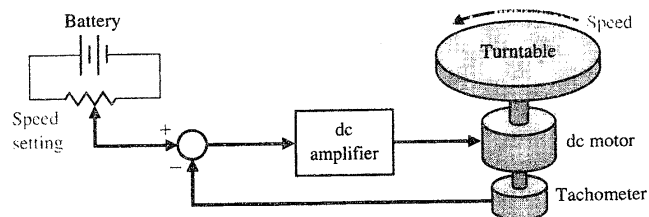


Fig. a Close-loop control of the speed of a turntable

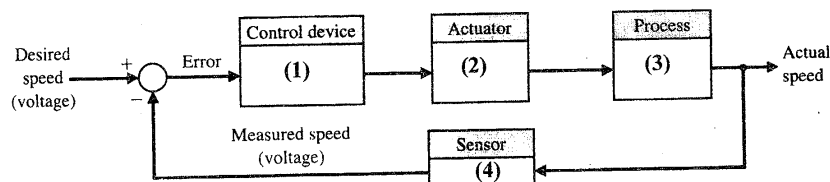
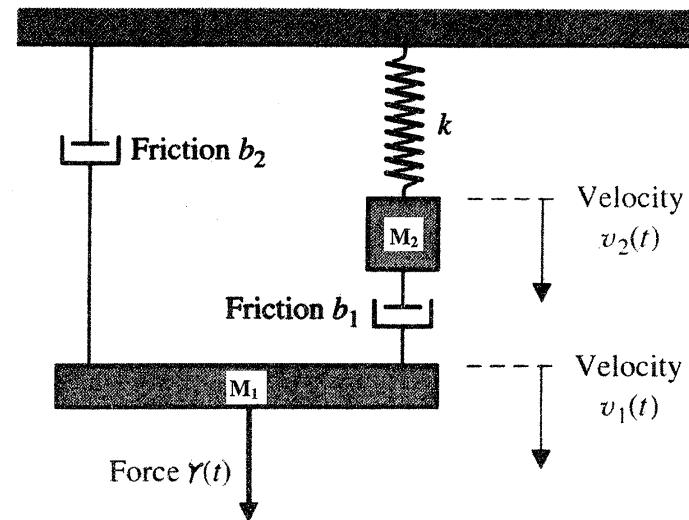


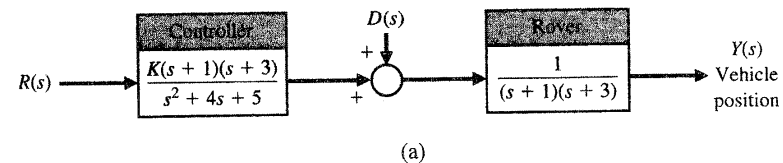
Fig. b Block diagram model

二、 Consider the mechanical system shown below. Please find the transfer function from the force  $r(t)$  to velocity  $v_1(t)$ ? (20%)

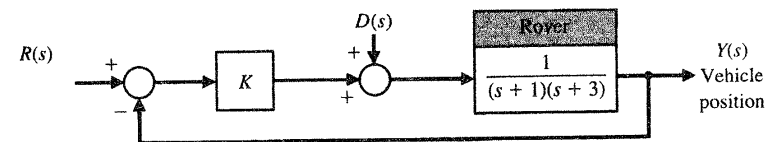


三、

1. Please find the transfer functions from  $R(s)$  to  $Y(s)$  for the open-loop system (a) and the closed-loop system (b) in the figure below. (8%)
2. Find the sensitivity of the transfer functions of the open-loop and closed-loop systems associated with the change of the gain  $K$ ? (10%)
3. Compare steady state value under the effect of the unit step disturbance? (10%)



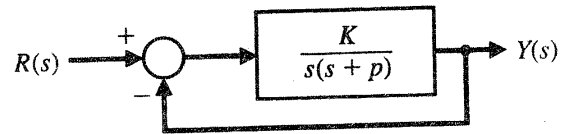
(a)



(b)

注意：背面尚有試題

- 四、A single-loop feedback control system is shown below. We desired to select the gain  $K$  and the parameters  $p$  so that the time-domain specifications indicated below will be satisfied. The transient response to a step should be as fast as is attainable while retaining an overshoot of less than 5%. Furthermore, the settling time to within 2% of the final value should be less than 4 seconds. Please find appropriate  $K$  and  $p$ . (20%)



- 五、Please select two parameters  $K$  and  $a$  so that a turning control for a tracked vehicle (the block diagram is shown below) is stable and the steady-state error for a ramp command is less or equal to 24% of the magnitude of the command. (20%)

