國立中正大學
111 學年度碩士班招生考試
試 題

［第 2 節］

科目名稱	自動控制
系所組別	機械工程學系-乙組
	機械工程學系光機電整合工程

－作答注意事項－

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

1. 預備鈴響時即可入場,但至考試開始鈴響前,不得翻閱試題,並不得書寫、畫記、作答。

2. 考試開始鈴響時,即可開始作答;考試結束鈴響畢,應即停止作答。

3. 入場後於考試開始 40 分鐘內不得離場。

4. 全部答題均須在試卷(答案卷)作答區內完成。

5. 試卷作答限用藍色或黑色筆(含鉛筆)書寫。

6. 試題須隨試卷繳還。

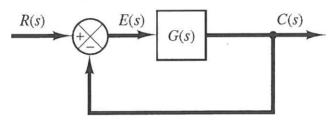1. Given the open-loop transfer function $G(s)$, please determine its closed-loop transfer function with your calculation procedure. (10%)
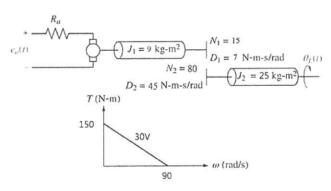

2. Please find the poles, natural frequency, damping ratio of the following transfer functions and report the kind of response expected (unnecessary to plot it). (20%)

$$\frac{6}{s^2+3s+6} \qquad \frac{12}{s^2+4s+12} \qquad \frac{4}{s^2+10s+4} \qquad \frac{25}{s^2+10s+25}$$
$$\text{(a)} \qquad\qquad \text{(b)} \qquad\qquad \text{(c)} \qquad\qquad \text{(d)}$$

3. In the following figure, a load is driven with a motor whose torque–speed characteristic is shown in the following figure. Determine the transfer function, $G(s) = \theta_L(s)/E_a(s)$. (20%)

4. The following system $G(s)$ is assumed to have unity feedback. Please find the <u>system type</u> and <u>steady-state errors</u> with unit-step input, unit-ramp input, and unit-parabolic input. (15%)

$$G(s) = \frac{3(s+4)(s+8)}{s^2(s+3)(s+5)(s+7)}$$

5. For the unity-feedback system, find the value of K to yield a K_a of 500. (15%)

$$G(s) = \frac{K(s+7)(s+2)(s+5)(s+4)}{s^2(s+6)(s+8)(s+3)}$$

6. Find the transfer function, $G(s) = X_2(s)/F(s)$, for the system shown in the following figure. (20%)