

國立彰化師範大學 102 學年度碩士班招生考試試題

系所：車輛科技研究所

選考乙

科目：自動控制

☆☆請在答案紙上作答☆☆

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1. Find the transfer function, $G(s)=C(s)/R(s)$, corresponding to the differential equation

$$\frac{d^3c}{dt^3} + 3\frac{d^2c}{dt^2} + 7\frac{dc}{dt} + 5c = \frac{d^2r}{dt^2} + 4\frac{dr}{dt} + 3r. \quad (20\%)$$

2. Find the state equations and output equation for the phase-variable representation of the

transfer function, $G(s) = \frac{2s+1}{s^2+7s+9}$ (20%)

3. Determine the validity of a second-order step-response approximation for transfer function

shown as $G(s) = \frac{185.71(s+7)}{(s+6.5)(s+10)(s+20)}$ (20%)

4. A unity feedback system has the forward transfer function $G(s) = \frac{1000(s+8)}{(s+7)(s+9)}$,

(a) Evaluate system type, K_p , K_v , and K_a (10%)

(b) Use your answer to (a) to find the steady-state errors for the standard step, ramp, and parabolic input. (10%)

5. Given the function $F(z) = \frac{0.5z}{(z-0.5)(z-0.7)}$, find the sampled time function. (20%)