Eskişehir Osmangazi University - Electrical Engineering Department Fundamentals of Control Systems Midterm Examination - Spring 2016

All answers must be written in the appropriate neighborhoods of the questions. Anything written elsewhere will not be graded. Use the back side of the exam sheet if you need scratch paper. Duration: 65 min., Calculator is allowed, An A4 size sheet (both sides for any content) is allowed.

Question 1. -

For the configuration on the left, input signal is a step function with amplitude 2. Find the steady state signals at E, F, and C.

[8p] (a) $E_{ss} = 0$, [8p](b) $F_{ss} = 8$, [9p] (c) $C_{ss} = 2$



Question 2. –

For the configuration on the left, input signal is a step function with amplitude 2. Find [12p](a) the maximum value attained by C and [13p](b) the time it occurs. (a) $\rightarrow 2$ (b) ∞



Question 3. —									
Let the polynomial equation $s^5 + s = 0$ be given. (a) Write the Hurwitz matrix for the polynomial (b) Write the leading principal leading minors. Grading for this problem: Only (a)=12p, (a) and (b)=25p, only (b)=0p. (a)	$\begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$	$egin{array}{c} 0 \\ 0 \\ 0 \\ 1 \\ 0 \end{array}$	$egin{array}{c} 0 \\ 1 \\ 0 \\ 0 \\ 0 \end{array}$	$egin{array}{c} 0 \\ 0 \\ 0 \\ 1 \\ 0 \end{array}$	$\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$,	$egin{array}{c} \Delta_1 \ \Delta_2 \ \Delta_3 \ \Delta_4 \ \Delta_5 \end{array}$	0 0 0 0 0	

Question 4.

Let the polynomial equation

$$s^6 + 2s^5 + 4s^4 + 4s^3 + 5s^2 + 6s + 7 = 0$$

Answer

It has 4 roots in the open left half plane.

[25p] How many roots does it have in the open left half plane?

Good Luck A. Karamancıoğlu