Code No: NR421302 **NR**

IV B.Tech II Semester Supplementary Examinations, Apr/May 2006
COMPUTER AIDED DESIGN OF CONTROL SYSTEMS
(Electronics & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Determine the stability of the system described by

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \textit{ by using liapunov stability.}$$

[16]

2. (a) The system matrix P(S) = $\begin{bmatrix} 1 & 0 & 0 \\ 0 & (s+1)^2 & s^3 \\ 0 & -1 & 2-s \end{bmatrix}$

   (b) Reduce the order of the system matrix P(S) = $\begin{bmatrix} s & 0 & 1/L2 \\ 0 & s & 1/L2 \\ -1 & 0 & 0 \end{bmatrix}$ with order 2. [8+8]

3. Explain the effect of a phase lead compensator using the inverse Nyquist diagram. [16]

4. (a) Examine the phase lead and phase leg contribution by the zero in g(s) = $\frac{\alpha - s}{\alpha (1+s)^3}$

   (b) If g(s) = $\frac{1-s}{(1+s)^2}$. Show that the open loop step response is y(t) = [1 - e^t - 2te^t] v (t) [8+8]

5. Explain frequency response criteria for stability with an example. [16]

6. Sketch the Gershgorin row bands for Q(s) = $\begin{bmatrix} \frac{s+4}{(s+1)(s+5)} & \frac{1}{s+5} \\ \frac{s+3}{(s+1)(2s+5)} & \frac{2}{2s+5} \end{bmatrix}$ and investigate the closed loop stability. [16]

7. Describe the following functions
   (a) zems
   (b) P2map
   (c) Group
   (d) Ackr [16]

8. Write a MATLAB program that reads an input temperature in degrees Fahrenheit (^{0}F), converts if to an absolute temperature in Kelvins.
   $T(^0k) = \frac{5}{9}[T(^0F) - 32.0] + 273$ [16]

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