NR/R09

Code No: B4305/D4305

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech II - Semester Examinations, October/November 2011
DIGITAL CONTROL SYSTEMS
(POWER ELECTRONICS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) Explain the Sampling theorem.
b) Explain the mapping between S-plane and Z-plane.
c) Given G(s) = k/s(s+a) Find the pulse transfer function G(z). [12]

2.a) Solve the following difference equation by using Z-transform.
X(K+2)+3Y(K+1)+4/(K)=r(K+1)-r(K)
b) Find the inverse Z-transform of $\frac{z}{(z-2)^2(z-3)}$. [12]

3.a) Find the Eigen values, Eigen vectors and jordan form representations for the following matrix:

$$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$$

b) Consider the system

$$\begin{bmatrix} \frac{dx_1}{dt} \\ \frac{dx_2}{dt} \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ -1 \end{bmatrix} u$$

$$y = [1\ 1] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Show that the output y is independent of the control function u. [12]

4.a) State and explain 2nd method of Liapunov theorem.
b) Consider the characteristic equation $p(z) = 4z^3 - 4z^2 - 7z - 2 = 0$, check the stability of the system. [12]

5.a) State the advantages of reduced state observer compared to full order state observer.
b) Explain the design of state feedback controlled through pole placement. [12]

6. Explain the design procedure of lag-lead compensators through bi-linear transformation. [12]

Contd…..2

7. Draw the block diagram representation of adaptive control system and explain each block in detail. [12]

8. Write short notes on the following
i) Dead beat response method
ii) Linear quadratic regulator
iii) Complementary strips. [12]

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