MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PE-EI702 Digital Control System

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

Answer any ten of the following : [1 x 10 = 10]

(i) Write the relationship between z-domain and s-domain.
(ii) What is the necessary condition to be satisfied for design using state feedback?
(iii) What is the need for state observer?
(iv) What is Nyquist rate?
(v) What is sampled data control system?
(vi) What is the ROC of z-transform of finite duration anti-causal sequence?
(vii) What is modal matrix?
(viii) What is the pole placement by state feedback?
(ix) What is the principle of fuzzy logic?
(x) Which controllers some amount of overshoot may occur?
(xi) What is the need for controllability test?
(xii) What is the ROC of a causal infinite length sequence?

Group-B (Short Answer Type Question)

Answer any three of the following [5 x 3 = 15]

2. Define linear time invariant system with example. [5]
3. Discuss the mathematical modeling of sample and hold circuit. [5]
4. Discuss the initial and final value theorem of Z-transform. [5]
5. State and explain Lyapunov stability. [5]
6. How the modal matrix is determined? [5]

Group-C (Long Answer Type Question)

Answer any three of the following [15 x 3 = 45]

7. Write short notes of the following : a. Controllability b. Observability c. Digital compensator design using frequency response plot. [15]
8. (a) Explain stability conditions of closed loop systems in Z over in S plane. [10]
   (b) Discuss the necessary conditions of Jury stability. [5]
9. (a) Discuss relation between bilinear transformation and w-plane. [8]
   (b) Explain phase lag, lead and lag-lead compensator. [7]
10. (a) Find the inverse-transform of: $1/(1-Z^{-1})(2-Z^{-1})$ [8]
    (b) $(4Z^2-2Z)/(Z^3-5Z^2+8Z-4)$ [7]
11. (a) Explain different State Space Representation of discrete time systems methods. [10]
    (b) What is state space? Discuss the significance of State space. [5]

*** END OF PAPER ***