

Code No: 127CG/117CG/57018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2021

DIGITAL CONTROL SYSTEMS

(R15 – Electrical and Electronics Engineering; R13 - Electrical and Electronics Engineering; R09 - Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) What is data control system? Explain with the help of examples.
b) Solve the following difference equation by use of the z transform method
 $2x(k+2) + x(k+1) + 7x(k) = 0, \quad x(0) = 0, x(1) = 3$ [7+8]
- 2.a) Explain the relationship between s-plane and z-plane.
b) Obtain the inverse z-transform of
$$X(z) = \frac{(z+4)}{z(z-5)}$$
 [7+8]
- 3.a) Explain the Controllability and Observability conditions for Pulse Transfer Function.
b) Check whether the system whose pulse transfer function given below is state controllable or not [7+8]
$$\frac{Y(z)}{U(z)} = \frac{(z+1)}{(z+8)(z+2)}$$
- 4.a) What are the Methods for Computation of State Transition Matrix? Discuss.
b) Consider the following system. Derive the state space representation in the controllable canonical form [7+8]
$$\frac{Y(z)}{U(z)} = \frac{z+3}{z^2+6z+3}$$
- 5.a) Draw Constant damping ratio loci and explain the stability of discrete time control system.
b) Examine the stability of the following characteristic equation
 $P(z) = 2z^4 + 3z^3 - 6z^2 + 2z - 4 = 0$ [7+8]
6. How Bilinear Transformation is used in stability analysis? Explain with a suitable example. [15]
- 7.a) Explain the Design procedure of Discrete Time Control System in w-plane.
b) Explain the design of lead compensator [7+8]
- 8.a) Explain in detail about the concept of reduced order state observers.
b) Discuss about the importance of Ackerman's formula in detail. [7+8]

---ooOoo---