DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Question Bank

Course: T.Y. B. Tech in Instrumentation Engineering

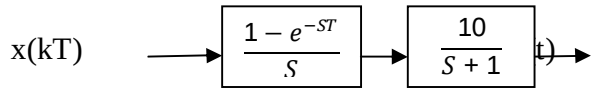
Sem: VI

Subject Name: Digital System

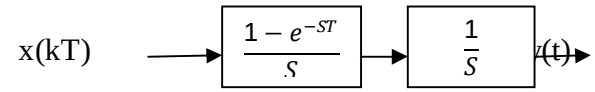
Subject Code: BTINC601

UNIT I

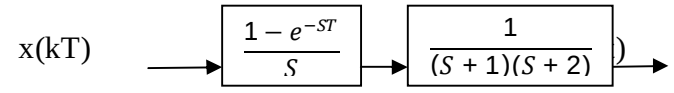
1. With the help of a neat block diagram, explain the basic elements of a digital control system.
2. What is Transfer Function? explain procedure to obtain Discrete transfer function.
3. Derive the transfer function of Zero Order Hold from its impulse response
4. Write short note on Transformation between S, Z, W plane
5. Obtain Transfer function of given system using ZOH equivalent with T=1 sec



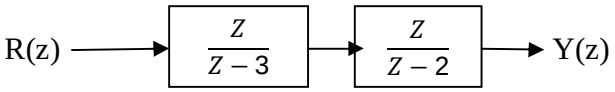
6. Obtain Transfer function of given system using ZOH equivalent with T=1 sec



7. Obtain Transfer function of given system using ZOH equivalent with T=1 sec



8. The Discrete time system show in figure find Transfer function



Unit-II

1 Define Root locus? Explain steps of Root Locus.

2 Sketch the Root locus of given system $G(s).H(s) = \frac{K}{(S+1)(S+2)(S+3)}$

3 Sketch the Root locus of given system $G(s).H(s) = \frac{K}{(S)(S+4)(S^2+4S+20)}$

4. Sketch the Root locus of given system $G(s).H(s) = \frac{K(S+2)}{(S+3)(S^2+2S+2)}$

5. Sketch the Root locus of given system $G(s).H(s) = \frac{K}{S(S+2)(S^2+2S+5)}$

6 Explain Lag compensation technique.

7. Explain Lead Compensation technique.

Unit-III

1 Derive the representation between state model and Transfer function.

2 Obtain Transfer function of given system

$\dot{X}_1 = X_2$

$\dot{X}_2 = -X_2 + X_3$

$\dot{X}_3 = -X_2 - 10X_3 + 10\,u$

$Y = X_1$

3 Obtain Transfer function of given system

$\dot{X}_1 = -2X_1 - X_2 + 3u$

$\dot{X}_2 = -3X_1 - 2X_2 + 4u$

$Y = 2X_1 + X_2$

4 Draw the SFG & construct State space model of given system $T(s) = \frac{s^2+2s+3}{(s^3+2s^2+3s+1)}$

5 Draw the SFG & construct State space model of given system $T(s) = \frac{s^3+8s^2+17s+8}{(S+1)(S+2)(S+3)}$

6 Obtain State model in Canonical form of given system $T(s) = \frac{s+3}{s^2+2s+2}$

7 Obtain State model in Canonical form of given system $T(s) = \frac{5}{(S+1)(S+2)(S+4)}$

Unit-IV

1 Check the given system is Controllable or not

$\dot{X}_1 = -2X_1 + X_2 + u(t)$

$\dot{X}_2 = X_2$

$Y = 2X_1 + 2X_2$

2 Check the given system is Controllable or not

$\dot{X}_1 = -X_1 + u(t)$

$\dot{X}_2 = -2X_2 + u(t)$

$Y = 2X_1 - X_2$

3 Check the given system is Observable or not

$\dot{X}_1 = X_2$

$\dot{X}_2 = X_3$

$\dot{X}_3 = -6X_1 - 11X_2 - 6X_3 + u(t)$

$Y = 20X_1 + 9X_2 + X_3$

4 Check the given system is Observable or not

$\dot{X}_1 = X_2$

$\dot{X}_2 = X_3$

$\dot{X}_3 = -X_2 - 63 + u(t)$

$Y = 3X_1 + 4X_2 + X_3$

5 Explain the concept of pole placement by state feedback.

Unit-V

1 Derive the state and output equations in observable canonical form.

2 Write short note on State Observers.

3 Write short note on Deadbeat controller design.

4 Explain the concept of controller design for delayed system.

Unit-VI

1 Examine the stability of the following equation using Jury test

$P(z) = z^4 - 1.2\,z^3 + 0.07z^2 + 0.3z - 0.08 = 0$

2 Examine the stability of the following equation using Jury test

$P(z) = z^3 - 1.1z^2 - 0.1z - 0.2 = 0$

3 Construct the Jury stability table for the following characteristics equation

$P(z) = a_0z^4 + a_1z^3 + a_2z^2 + a_3z + a_4$

4 Check the following system is stable or not by using stability analysis methods $G(s) = \frac{10}{S(S+1)}$

5 Explain stability impotents by state feedback.

6 Explain stability analysis to linear system.