Exam.Code:0935
Sub. Code: 33762

2076

B.E. (Electrical and Electronics Engineering)

Fifth Semester

PC-EE-502: Control Engineering - II

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit. Assume any missing data.

x-x-x

1. (a) Differentiate between feedback and feedforward systems.

   (b) Write purpose of ZOH in digital control system.

   (c) Find z-transform of e^{at}.

   (d) What are state, state variables and state model?

   (e) Prove: $\emptyset(-t) = \emptyset^{-1}(t)$ (5x2)

UNIT - I

2. (a) State model of system is:

$$\dot{x} = \begin{bmatrix} -1 & -4 & -1 \\ -1 & -6 & -2 \\ -1 & -2 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} u$$

$$y = [1 \quad 1 \quad 1]x$$

   Find its transfer function and draw signal flow graph.

   (b) Discuss working of ON/OFF controller with significance of hysteresis.

   (5,5)

3. (a) What do you mean by tuning of controllers? Explain Zeigler-Nicholas method.

   (b) Determine controllability and observability:

$$\dot{x} = \begin{bmatrix} -3 & 1 & 1 \\ -1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} x + \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} x$$

   (5,5)

4. Explain designing of lag compensator for control system using bode plot technique. Write its applications. (10)

P.T.O.

UNIT - II

5. (a) Explain sampling process with neat and clean waveforms. What is ideal sampler?

   (b) Derive formula for pulse transfer function of digital control system if sampler is present in both error and feedback paths. (5,5)

6. Using Bilinear transformation, find stability:

$$z^3 - 0.5z^2 + 0.919z - 0.049 = 0$$

(10)

7. Draw block diagram of digital temperature control system. Explain its control algorithm. (10)

x-x-x