Exam.Code:0935
Sub. Code: 33762

2124

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 Part. Assume any missing data.***

x-x-x

1. (a) Write applications of digital control systems.
   (b) Differentiate between feedforward and feedback control.
   (c) Discuss the selection of controllers for various applications.
   (d) Prove: $[\phi(t)]^n = \phi(nt)$
   (e) Discuss significance of observability feature of control system.

(5*2)

PART-A

2. Obtain time response of the following system:

$$\begin{bmatrix} \dot{x_1} \\ \dot{x_2} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

$$\begin{bmatrix} x_{1(0)} \\ x_{2(0)} \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

where $u(t) = 0 \; for \; t < 0 \; and \; u(t) = e^{-t} \; for \; t > 0$

(10)

3. Explain steps of designing of lag compensator for control system using bode plot technique. Also discuss its applications.

(10)

P.T.O.

4. A unity feedback system has open loop transfer function as:

$$G(s)H(s) = \frac{5}{(s+1)(s+2)}$$

A PID controller having transfer function as:

$$G_c(s) = 1 + \frac{0.2}{s} + 0.5s$$

is introduced in control system. Determine its effect on damping ratio, settling time and velocity error constant.

(10)

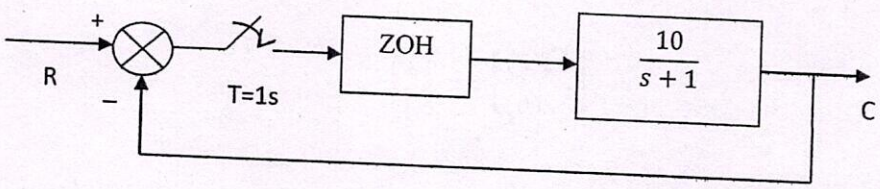
PART-B

5. (a) Find z-transform if $f(t) = 2u(t) + t$

(b) Discuss the process of mapping s-plane to z-plane for finding stability of digital control systems. Also, write conditions for stability.

(3, 7)

6. Find pulse transfer function for following:



(10)

7. Explain performance of permanent magnet stepper motor. Also, discuss its driving scheme using proper schematic diagram.

(10)

x-x-x