Exam.Code:0935
Sub. Code: 6669

2122

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.

x-x-x

I. Attempt the following:-

a) Prove the state transition identity: $\phi^{-1}(t) = \phi(-t)$

b) What is the significance of hysteresis in ON/OFF controller?

c) Find transfer function of ZOH.

d) What is the purpose of using sampler in digital control system?

e) What is the difference between a compensator and controller? (5x2)

UNIT - I

II. A system is described by following differential equations:

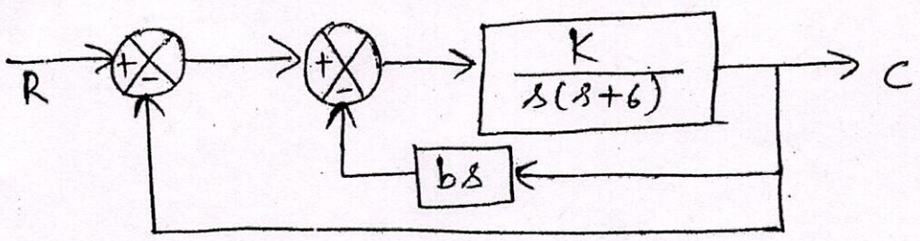
$$\frac{d^3x}{dt^3} + 3\frac{d^2x}{dt^2} + 4\frac{dx}{dt} + 4x = u_1(t) + 3u_2(t) + 4u_3(t)$$

The outputs are:

$$y_1 = 4\frac{dx}{dt} + 3u_1; \quad y_2 = 4\frac{d^2x}{dt^2} + 4u_2 + u_3$$

Obtain state space representation of the system. (10)

III. a) For the following system with rate feedback control, find 'K' and 'b' so as to meet following specifications: Peak overshoot = 16.5% and settling time = 1.5 seconds.



b) What is the importance of tuning of PID controllers? Explain Kuhn-Kohn method for this. (5,5)

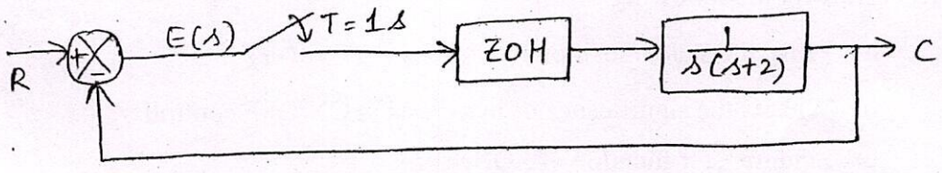
IV. Explain how a LEAD Compensator can be designed using any time domain approach. Clearly explain all the steps with one example. (10)

P.T.O.

UNIT - II

V. Explain how s-plane is mapped to z-plane and hence derive condition for stability for digital control system in z-plane. (10)

VI. Obtain pulse transfer function for the following system.



(10)

VII. a) Explain working and operation of digital position control system.

b) Explain block diagram of digital temperature control system. (2x5)

x-x-x