2021
B.E. (Electrical and Electronics Engineering)
Fifth Semester
EE-509: Control Engineering – II

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.*

x-x-x

I. Answer the following:-

a) Justify the presence of differential gap in ON/OFF controller

b) Use one daily life example to explain physical significance of observability concept.

c) Is it possible to operate a digital control system without HOLD? Explain

d) Give selection criterion for Lead/Lag compensators.

e) Use proper equations to explain the concept behind state transition matrix. (5x2)

UNIT – I

II. A system is described by following differential equations:

$$\frac{d^3 y(t)}{dt^3} = u(t)$$

Where y(t) is observed output and u(t) is input. Express the system in state model. Check controllability and observability of the system.   (10)

III. A system shown in Figure 1 is placed in rate feedback control organisation. Find K and b so as to meet the following specifications:
a) Peak overshoot ≤ 16.5%
b) Settling time ≤ 1.5 seconds.

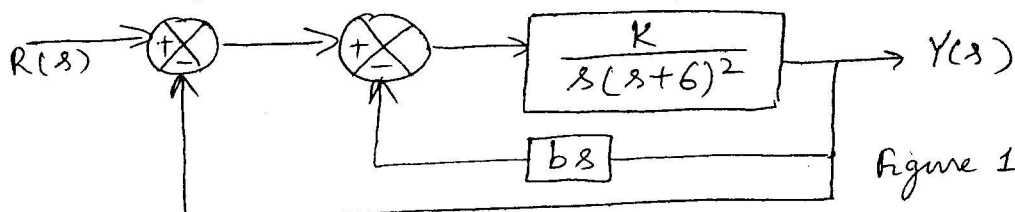Also, discuss the effect of rate control on system performance using the values obtained in the question.

Figure 1.

(10)
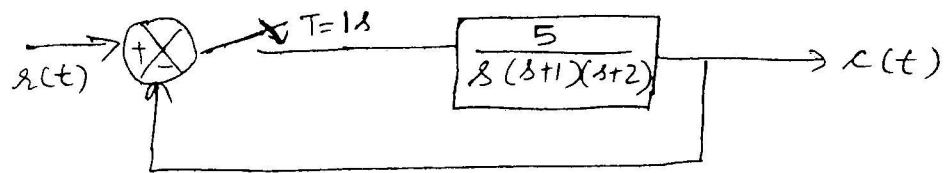
P.T.O.

IV. Discuss the procedure to design a Lag compensator in frequency domain approach using a general example. (10)
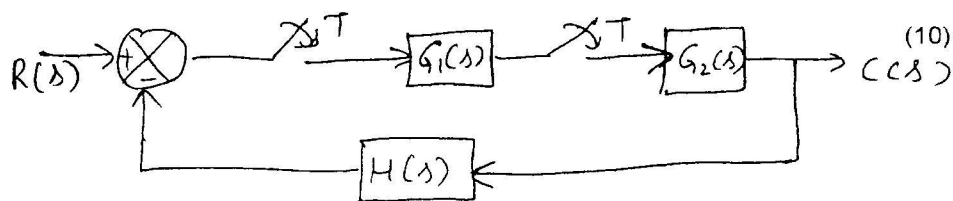
UNIT – II

V. For the following system, determine characteristic equation in z-domain and ascertain its stability via bilinear transformation

(10)

VI. a) Explain temperature control system for digital applications.

b) Discuss significance of programmable logic control in digital control systems. (2x5)

VII. Find pulse transfer function for the following system:-

(10)

(10)

x-x-x