

2056

B.E. (Electronics and Communication Engineering)

Sixth Semester

EC-624: Control System

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 Section. Use of scientific calculator is allowed.

x-x-x

Q.1 Attempt all questions: -

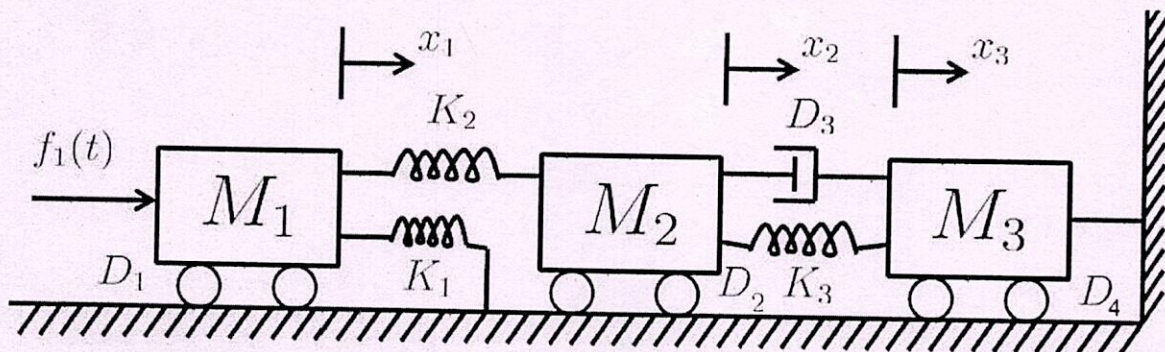
- What are the different types of control system? (2)
- What is the difference between AC servo motor and D.C servo motor? (2)
- Outline the Bode plot for a Proportional Integral controller. (2)
- How do you determine the system eigen values and what is its role in the system response? (2)
- What are the properties of state transition matrix? (2)

Section- A

Q. 2(a) Contrast differences between open loop and closed loop control systems.

(b) Find the transfer function of the mechanical system $X_1(S)/F(s)$.

(2x5)



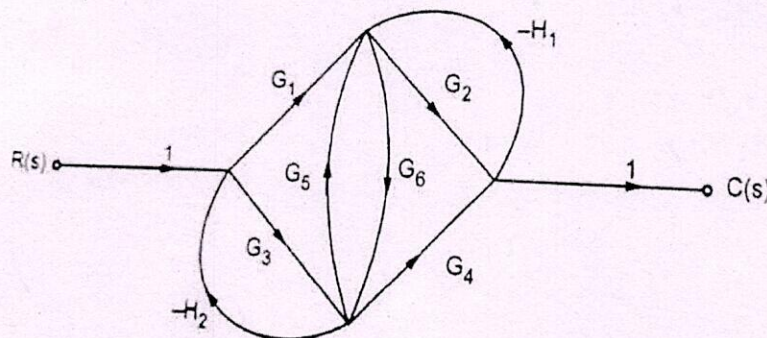
Q.3 (a) The open loop transfer function of an unity feedback control system is given as

$$G(s) = K/(S(1 + ST))$$

Determine the factor by which the gain 'K' should be multiplied so that the overshoot of the unity step response be reduced from 80% to 25%?

(b) Apply Mason's Gain formula to find the transfer function for the signal flow graph shown.

(2x5)



P.T.O.

(2)

- Q.4** Sketch the root locus of the $GH(s)=K/\{S(S+5)(S+7)\}$ and determine dominant pole for damping ratio 0.8. (10)

Section-B

- Q.5** A control system $G(s)H(s) = \frac{K(1+0.1s)}{s(1+0.2s)(1+s)}$ has unity feedback. Sketch the Bode plots and determine Gain margin and Phase margin. (10)

- Q.6** A unity feedback control system has an open loop transfer function given by

$$G(s)H(s) = \frac{10}{s(s+3)(s+6)}$$

Draw Nyquist diagram and determine stability. (10)

- Q.7** (a) Distinguish between Transfer function model and State Space model.
(b) The transfer function of the system is given as

$Y(s)/U(s) = (2)/(S^3+6S^2+11S+6)$. Discuss the controllability and observability Of the system. (2x5)

x-x-x