

Roll No.

Total No. of Questions : 09]

May 2007

[Total No. of Pages : 03

J-446[6037B]

[2957]

B.Tech. (Semester - 4th)

LINEAR CONTROL SYSTEM (IC - 204)



Time : 03 Hours

Maximum Marks : 60

Instruction to candidates :

- 1) Section - A is **compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

(10 × 2 = 20)

Q1)

- a) Define close loop control system with suitable example.
- b) Differentiate between linear and non-linear systems.
- c) Explain the servomechanism used in control systems.
- d) Define source, sink, path gain and non touching loops in a signal flow graph.
- e) Define the maximum overshoot and settling time in relation to step response of a second order system.
- f) Differentiate between overdamped, critically damped and underdamped systems.
- g) Give the time response of a control system if it has:- double roots at origin, one pair of roots on $j\omega$ axis.
- h) Give the centroid and directions of asymptotes for root locus of a system whose open loop transfer function is $K(s+1)/s^2(s+2)$.
- i) Define phase margin and gain margin in a polar plot.
- j) Define lag compensator with the help of its transfer function.

P.T.O.

Section - B

(4 × 5 = 20)

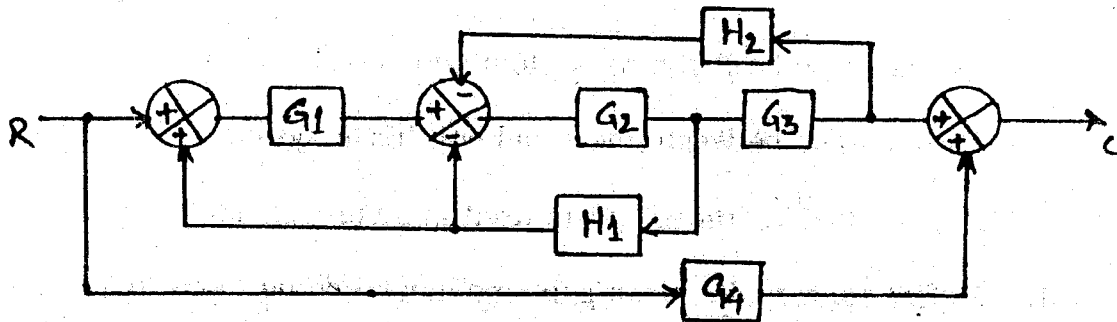
Q2) Why AC techogenerator is used in control system? Explain its function with the help of a suitable diagram.

Q3) Give the relation between the time and frequency responses of a second order system.

Q4) Discuss the Routh - Hurwitz criteria for determining the stability of a control system and calculate the range of K for stable operation of following characteristic equation.

$$S^4 + 4S^3 + 13S^2 + 36S + K = 0$$

Q5) Draw the signal flow graph for the following system and calculate the transfer function using Mason's gain formula.



Q6) Draw the mathematical model of the following system and obtain the transfer function.

