Exam.Code:0934
Sub. Code: 6978

1079

B.E. (Electrical and Electronics Engineering)
Fourth Semester
EE-402: Control Engineering

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. Graph paper and semilog graph paper shall be provided. Assume and specify any missing data.

x-x-x

I a) Differentiate between linear and non linear system. 5x2
b) How is a servo motor different from a DC motor?
c) Explain and differentiate the terms: absolute stability and relative stability.
d) What is the advantage of expressing Bode magnitude in decibels?
e) What is importance of checking location of closed loop poles on the imaginary axis of complex s-plane?

Part- A

II (a) Obtain the output of the system in Fig. 1 using block reduction technique. (5)

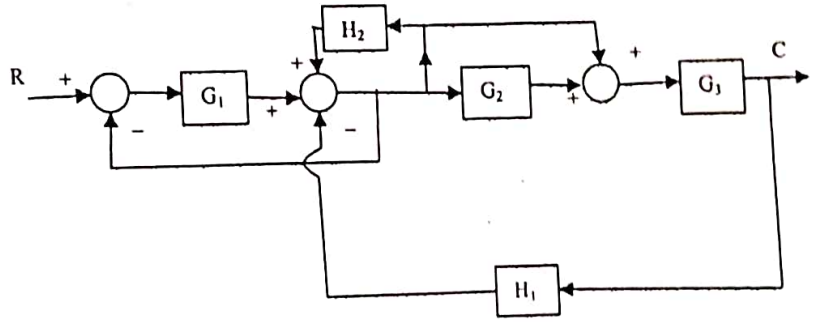

Fig.1

(b) Discuss the effect of feedback on: (5)
(i) Sensitivity to parameter variation.
(ii) Control of effect of disturbance signals.

III (a) Derive the Force (Torque)- Current analogy between the quantities of mechanical (translational and rotational) and electrical systems. (5)

(b) Determine the time response specifications and expressions for output for unit step input(y-output, x-input) to a system having system equation as follows: (5)

$$\frac{d^2y}{dt^2}+5\frac{dy}{dt}+16y=9x$$

P.T.O.

IV (a) Define steady state error and error constants with respect to unit step, unit velocity and unit acceleration inputs. How can steady state error be reduced? (5)

(b) Using Routh-Hurwitz criterion, check the stability of the system with characteristics equation as: (5)

$$s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$$

Part- B

V The open loop transfer function of a unity feedback control system is (10)

$$G(s)H(s) = \frac{K}{s(s+4)(s^2+4s+20)}$$

Draw the root locus of the system determining the important parameters.

VI Construct a Bode Plot for the system whose open-loop transfer function is given by : (10)

$$G(s)H(s) = \frac{4}{s(1+0.5s)(1+0.08s)}$$

and determine (a) Gain Margin (b) Phase Margin and the closed loop stability.

VII (a) Explain the construction and working of Synchros as error detector. (5)

(b) Explain how relative stability can be assessed using Nyquist Criterion. (5)

x-x-x