(25)

e: 697

Exam.Code:0934
Sub. Code: 6978

1059

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

Max. Marks: 50

allowed: 3 Hours

TE: *Attempt <u>five</u> questions in all, including Question No. I (Part-A) which is compulsory and selecting two questions each from Part B-C. Assume and specify any missing data. Graph paper and semilog graph paper shall be provided.*

x-x-x

Part- A

I 5x2

a) Differentiate between linear and non linear control system.
b) Discuss Bounded input-bounded output stability.
c) Give basic equations and analogy of electrical and mechanical systems.
d) Derive an expression for velocity and acceleration error constants.
e) What is electrical zero position of control transformer of synchros? Give its significance.

Part- B

II (a) Give the different components of a control system. Explain with diagrams different types of control systems. (5)

(b) Find transfer function of the system shown in Figure 1 using Mason' gain formula. (5)

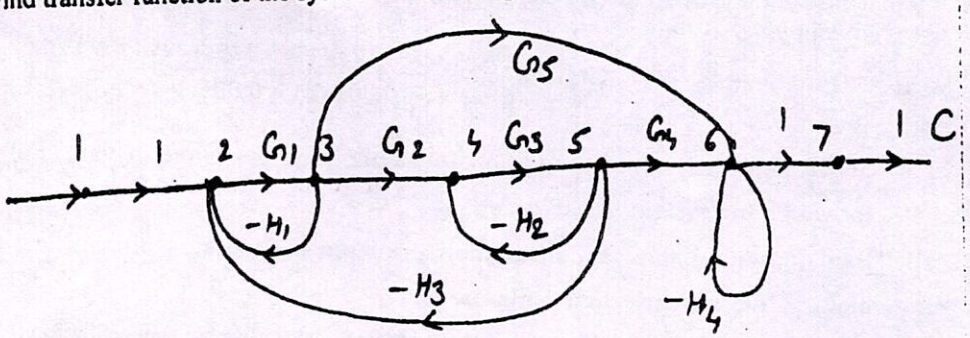

Figure 1

P.T.O.

III Obtain the output of the system in Fig. 2 using block reduction technique. (10)

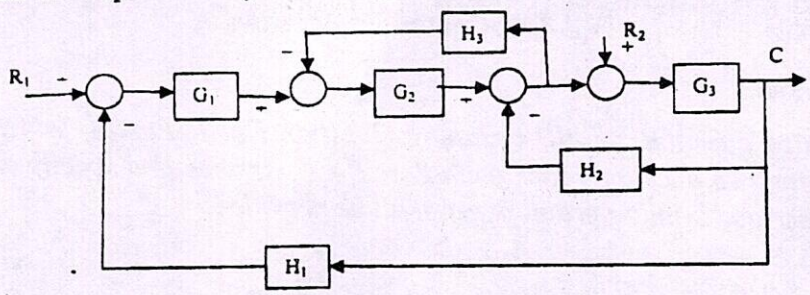

Fig.2

IV (a) What is significance of standard test signals? Explain different standard test signals. (5)

(b) A feedback control system has an open loop transfer function (5)

$$G(s)H(s) = \frac{Ke^{-s}}{s(s^2 + 5s + 10)}$$

Find limiting value of K for maintaining stability.

Part- C

V A feedback control system has an open loop transfer function (10)

$$G(s)H(s) = \frac{K}{s(s^2 + 4s + 8)}$$

Find the root locus as K is varied from 0 to ∞.

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

$$G(s)H(s) = \frac{K(1 + 0.2s)(1 + 0.025s)}{s^3(1 + 0.001s)(1 + 0.005s)}$$

Show that the system is conditionally stable. Find the range of values of K for which the system is stable

VII (a) Explain, with diagrams, construction, principle and working of brushless dc motor. Give its merits and demerits. (5)

(b) Explain the correlation between time and frequency domain specifications for second order system. (5)

x-x-x