Exam.Code:0930
Sub. Code: 6607

2053

B.E. (Electronics and Communication Engineering)

Sixth Semester

EC-624: Control System

Time allowed: 3 Hours

Max. Marks: 50

***NOTE:*** *Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

*x-x-x*

I. Answer the following:-

a) Define automatic control system.

b) Give the difference between linear and non-linear control systems.

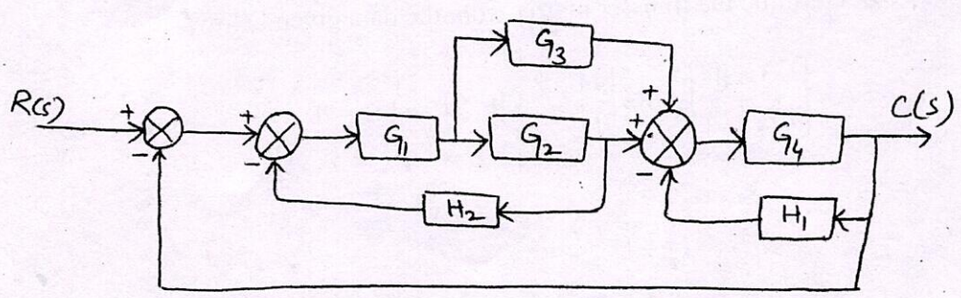
c) Define position, velocity and acceleration error constants.

d) State the effects of addition of poles.

e) What is a state transition matrix (STM)? (5x2)

**<u>UNIT - I</u>**

II. a) Draw the signal flow graph of the system represented by block diagram given below and determine $\frac{c(s)}{R(s)}$ using Mason's gain formula.




b) Derive a transfer function for pneumatic system. (2x5)

III. a) For a first order system, find out the output of the system when the input applied to the system is unit ramp.

b) For a unity feedback system $G(s) = \frac{200}{s(s+8)}$ and r(t) = 2t, determine steady state error. If it is desired to reduce the existing error by 5%, find new value of the gain of the system. (5,5)

IV. a) What do you mean by stability, absolute stability and conditional stability? State Routh-Hurwitz criterion.

b) Sketch the root locus to $G(s)H(s) = \frac{k}{s(s+3)(s+5)}$ $(k > 0)$ (5,5)

P.T.O.

## UNIT - II

V. Sketch the bode plot for the system whose open loop transfer function is given as

$$G(s)H(s) = \frac{20}{s(s+1)(s+4)}$$

Find (i) Phase margin (ii) Gain margin (iii) comment on stability. (10)

VI. a) Consider the transfer function

$$G(s)H(s) = \frac{60}{(s+1)(s+2)(s+5)}$$

Using Nyquist stability criterion, determine whether the closed loop system is stable or not.

b) What do you mean by compensator? Discuss series and parallel compensators.

(2x5)

VII. a) What do you mean by (i) Controllability and (ii) Observability?

b) Determine the transfer matrix from the data given below:-

$$A = \begin{bmatrix} -3 & 1 \\ 0 & -1 \end{bmatrix},\ B = \begin{bmatrix} 1 \\ 1 \end{bmatrix},\ C = \begin{bmatrix} 1 & 1 \end{bmatrix} \text{ and } D = 0$$

(5,5)

x-x-x