Exam. Code: 0934
Sub. Code: 6663

2023

B.E. (Electrical and Electronics Engineering)

Fourth Semester

PC-EE-403: Control Engineering - I

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 Unit.

x-x-x

I. Attempt the following:-

a) What is meant by absolute and relative stabilities? List various methods for determining these.

b) How are GM and PM defined in relation to frequency response analysis of control systems?

c) Differentiate between deterministic and stochastic control systems.

d) Give one physical example of error detector, control component feedback element and controlled system of a control system.

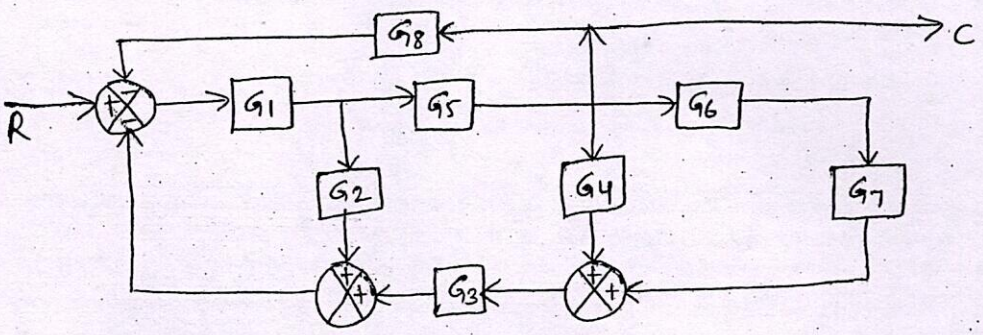
e) What is the physical significance of breakaway point in drawing root locus? (5x2)

UNIT - I

II. a) Discuss effects of feedback on sensitivity, time constant and stability of a control systems.

b) Discuss speed control of DC motor. (2x5)

III. Find input-output relationship for the following system using both block diagram reduction method and signal How graph method.



(5,5)

P.T.O.

IV. a) Find dynamic error coefficients of unity feedback system whose forward path transfer function is $G(s) = \frac{10}{s(s+1)}$

Also, find steady state error if input is $r(t) = a_0 + a_1 t + a_2 t^2$

b) Find all the time response specifications for a unity feedback system whose open loop transfer function is $G(s) = \frac{25}{s(s+6)}$ (2x5)

UNIT - II

V. Construct Bode plot for the system whose $G(s) = \frac{10(s+10)}{s(s+2)(s+5)}$

From the plot, find ω_{gc}, ω_{pc}, GM, PM and stability. (10)

VI. Find root locus whose $G(s) = \frac{k}{s(s^2+4s+8)}$ (10)

VII. Comment on stability using Nyquist Stability Criterion, for the system whose open loop transfer function is

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

Also, find GM and PM. (10)

x-x-x