

2014

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 Part.

x-x-x

1. a) What are regenerative control systems?
- b) Discuss affect of feedback on time constant of control systems.
- c) Differentiate between relative and absolute stability.
- d) Differentiate between linear and non-linear control systems.
- e) Write significance of Gain Margin and Phase Margin.

(5x2)

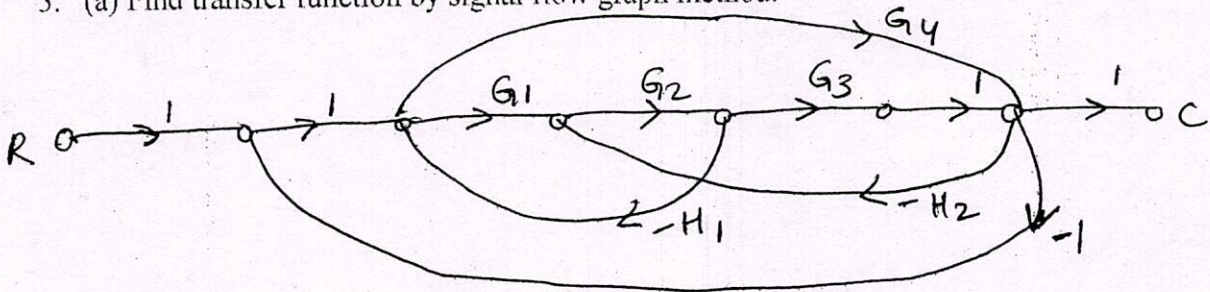
PART-A

2. (a) Draw neat and clean block diagram of closed loop control system and explain function of each component.

- (b) Explain working and operation of DC servomotor.

(5,5)

3. (a) Find transfer function by signal flow graph method.



- (b) Derive force-voltage and force-current analogies between mechanical and electrical systems.

(5, 5)

4. (a) The open loop transfer function of unity feedback system is

$$G(s) = \frac{K}{(s+2)(s+4)(s^2+6s+25)}$$

By applying Routh's-Hurwitz criterion, discuss stability of closed loop system as a function of K. Determine value of K which will cause sustained oscillations in closed loop system. What are the corresponding oscillations frequencies?

- (b) Define and explain all standard test input signals for control systems using suitable graphs.

(5, 5)

P.T.O.

(2)

**PART-B**

5. Sketch Root Locus for  $G(s) = \frac{K(s+12)}{s^2(s+20)}$

(10)

6. 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)

7. Write steps for drawing Bode Plot for a control system. Also, discuss how GM, PM and stability are found out using Bode Plot.

(10)

x-x-x