B. Tech Degree VI Semester Examination April 2011

CS/EC/EB/EI 605 CONTROL SYSTEMS ENGINEERING

(*2006 Scheme*)

Time : 3 Hours Maximum Marks : 100

PART – A

(Answer ***ALL*** questions)

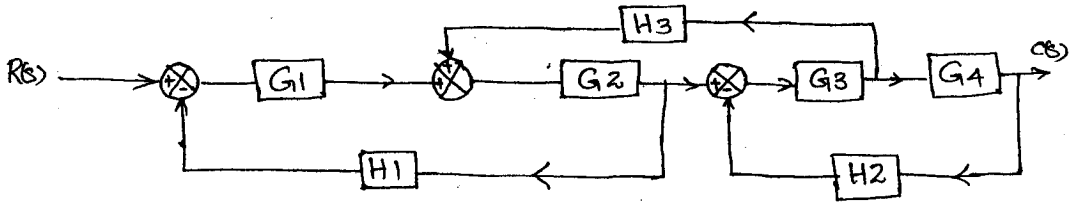
(8 x 5 = 40)

I. (a) Distinguish between open loop and closed loop system.
(b) What is a signal flow graph? What are its basic properties?
(c) What are generalized error coefficient? Give the relation between generalized and static error coefficients.
(d) What is the effect of PI, PD and PID controllers on the system performance?
(e) State and explain Nyquist Stability criterion.
(f) Explain different frequency domain specifications.
(g) What is BIBO stability criterion? Explain in detail.
(h) What is break-away and break in point? Explain how to determine them.

PART – B

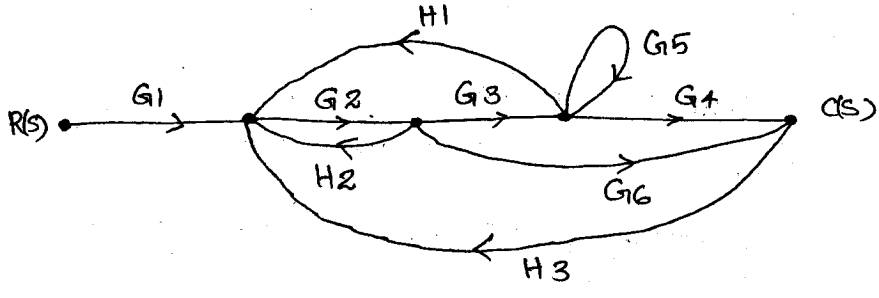
(4 x 15 = 60)

II. Simplify the block diagram shown to obtain the closed loop transfer function $C(s)/R(s)$.



OR

III. Find the over all gain $C(s)/R(s)$ for the signal flow graph.



IV. What are the different time domain specifications? Derive expression for each.

OR

V. The open loop transfer function of a unity feed back control system is given by

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

Apply Routh Hurwitz criterion to discuss the stability of the system. Determine the value of K for sustained oscillations in the closed loop system. What are the corresponding oscillating frequencies?

VI. Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies.

$$G(s)=\frac{10}{s(1+0.5s)(1+0.01s)}$$

OR

VII. The open loop transfer function of a unity feed back system is given by.

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

Sketch the polar plot and determine the gain and phase cross over frequencies.

VIII. A feed back control system has an open loop transfer function.

$$G(s)H(s)=\frac{K}{s(s+3)(s^2+2s+2)}$$

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

OR

IX. What are the basic characteristics of lead lag and lag lead compensation? Explain the design procedure of a lead compensator.

***