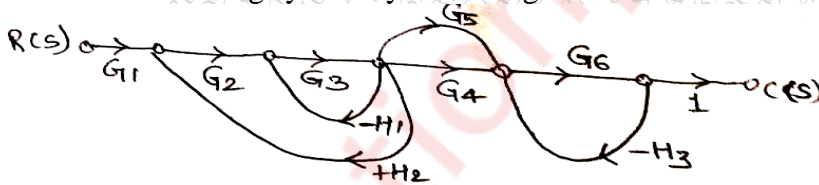


(3 hours)

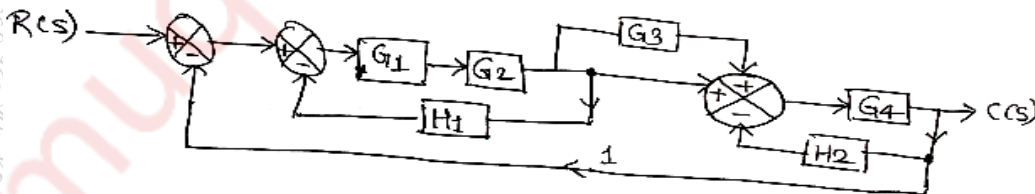
Total Marks: 80

- N.B.: (1) Question No. 1 is compulsory.  
 (2) Solve any three questions from remaining five questions.  
 (3) Draw neat diagrams and assume suitable data wherever necessary. Justify your assumptions.

1. (a) Define open loop control system .Give any five examples of open loop system 5
- (b) Define gain margin and phase margin. 5
- (c) Define (i) Rise time (ii) Peak overshoot 5
- (d) What is TYPE of system and Order of system? 5
  
2. (a) Define all time domain specifications along with diagram. 10
- (b) State how to Construct a Routh Array and determine the stability of system whose characteristic equation is  $S^4 + 2S^5 + 8S^4 + 12 S^3 + -16S + 16 = 0$  10
  
3. (a) Discuss the difficulties encountered in Routh Stability test. Explain Routh array method in detail. 10
- (b) Derive the expression for rise time and Peak overshoot. 10
  
4. (a) Explain the design procedure of lead compensator with suitable example. 10
- (b) Sketch Bode plot for following transfer function and determine gain margin and phase margin for  $G(s) = 100/S(S+1)(S+20)$  10
  
5. (a) Reduce the following system by Mason's gain formula. 10



- (b) State and explain the steps in drawing the root locus from any given system function. 10
  
6. (a) Solve the following using block diagram reduction method. 10



- (b) Construct root locus for given unity f/b control system whose function is  $G(S) = 1/S(S+4)(S^2+2S+2)$  10